



INTERNATIONAL CLINICS

A QUARTERLY

OF

ILLUSTRATED CLINICAL LECTURES AND
ESPECIALLY PREPARED ORIGINAL ARTICLES

ON

TREATMENT, MEDICINE, SURGERY, NEUROLOGY, PÆDIAT-
RICS, OBSTETRICS, GYNÆCOLOGY, ORTHOPÆDICS,
PATHOLOGY, DERMATOLOGY, OPHTHALMOLOGY,
OTOLOGY, RHINOLOGY, LARYNGOLOGY,
HYGIENE, AND OTHER TOPICS OF INTEREST
TO STUDENTS AND PRACTITIONERS
BY LEADING MEMBERS OF THE MEDICAL PROFESSION
THROUGHOUT THE WORLD

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Desiderius Erasmus of Rotterdam, from a portrait by Hans Holbein *Frontispiece*

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Diagnosis and Treatment

ALLERGIC DISEASES IN RELATION TO CLIMATE

By W STORM VAN LEEUWEN, M D

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THE chief result of recent investigations on the nature of allergic diseases carried out during the last six years in my institute, has been the realization of the fact that the most important factors in the causation of allergic diseases are climatic. In the monograph published in 1925,¹ I have amply explained the reasons which led us to this conception. We have proved that there are places in the world where asthma is a very common disease and this is certainly due to the factors of climate, since inhabitants suffering from asthma or other allergic diseases there are free from symptoms as soon as they leave their country and go to healthier places. A "healthy" place from this point of view is a place having a dry climate, an appropriate soil and a low level of ground water, a dry soil which takes up little water is preferable to a moist clay soil which takes up water readily, and a low level of the ground water is preferable to a high level.

We have quoted the statistics of Turban and Spengler which teach that 68 per cent of all asthmatics coming to Davos are free from attacks after two or three days, whereas an additional 25 per cent. are much improved after some weeks, only 7 per cent of cases remaining uninfluenced by high altitude. These figures agree fairly well with our conclusion that for about 90 per cent of all asthmatics, factors of climate play the dominant part in the etiology of their illness. According to our view of allergic disease, differences of climate are mainly differences in the quantity of climate-allergens in the air inside and outside the houses, and the beneficial influence of high altitude is to be ascribed almost entirely to the purity of the air, and to the absence of climate-allergens in the houses.

¹ W STORM VAN LEEUWEN, "Allergic Diseases," J B Lippincott Company, Philadelphia

Later work which could not be embodied in the monograph has brought us absolute proof of the correctness of our theories and has also enabled us to indicate microorganisms of animal and plant origin (among which moulds play an important part) as the main sources of climate-allergen. On the basis of these findings new principles for the treatment and prophylaxis of allergic diseases have been laid down and new methods worked out. Among these the installation of allergen-proof chambers, ventilated with purified air, takes the dominant position.

In the present paper the main points of this later work will be described, so that this communication will be of the nature of a continuation of my monograph.

* * *

If our conception of the influence of climate on allergic diseases is correct, *i.e.*, if the beneficial influence of high altitude is to be ascribed to the absence of climate-allergens, it should be possible to realize the same conditions in our lower countries. If a patient suffering from asthma due to climate-allergens is placed in a small chamber which does not contain any allergen and which is ventilated by pure air, the patient should after about two days be free from attacks. The realization of this condition demands. (1) A chamber with a bed and mattress and bedclothes which do not contain allergens, and (2) air made free of allergens. We have been able to obtain both these conditions in two private houses arranged as a clinic for allergic diseases, but before we give a description of this installation we must first consider some other points.

ORIGIN OF CLIMATE-ALLERGENS

In my monograph I have already described the investigations of Ancona and ourselves in which it was proved that small insects (*Pediculoides ventricosus* in Ancona's cases and common mites in ours) which often contaminate grain may produce very active allergens. The prevalence of these insects is more or less due to climatic influences, and consequently the products formed by these insects living in grain, hay, straw, packing material, etc., may be cited as examples of climate-allergens. These allergens are of importance for peasants, grocers, dealers in grain, and for all persons who have to handle straw, packing material, etc.

More important, however, than the insects are the common moulds which are present in all houses in low countries, and in moist—especially hot—climates. These moulds are not pathogenic for human beings in the usual sense of the word, they do not as a rule enter our body to produce toxic products there, but they stay outside our body in our beds, our carpets, rugs, in the floor of our houses, in the foundations, etc., and form their products which contaminate the air which we respire and are highly toxic for some persons (90 per cent. of all our allergies).

We will now proceed to give proof of the correctness of this thesis, and in doing so we will first give a description of one of our clinical cases.

Patient R. A., a girl of twenty four years, had been treated for asthma and eczema for more than a year with moderate success. She was a typical "climate" case. In Switzerland and in Grenoble in France (where she had stayed for half a year) she was always completely free of asthma and eczema, but both manifestations of her allergic state always reappeared as soon as she returned to her home, Amsterdam. In January, 1925, she asked our advice for an extraordinarily severe exacerbation of her eczema. Her entire body was covered with large areas of hemorrhagic eczema to a degree which surpassed anything I had ever seen of eczema. This eczema had started on the 22nd of December, 1924, and after searching for all sorts of causes which could have produced this severe reaction we finally asked her if she had changed her mattress in the days preceding the outbreak of eczema. We put this question because in preliminary investigations on allergen free chambers (which we had made at that time) it had occurred to us that something was the matter with the mattresses of asthmatics. To our great satisfaction the girl told us that on the 17th of December, 1924, five days preceding the acute exacerbation of eczema, she had changed her mattress for another one which had been kept unused on the top floor of the house for more than two years. The girl was advised to take a new mattress and her eczema cleared up considerably, but after two weeks we received a letter from her mother in which she stated that she had given the incriminated mattress to one of her younger daughters and this girl, who had never had any trace of eczema before, now developed eczema of the face. We then asked her to send us the mattress, and with the capoc (a material—not unlike rough cotton—which is generally used in Holland for filling mattresses) it contained, we made the following experiments.

First, extracts of this capoc were injected intracutaneously in a number of asthmatics and it was found that about 45 per cent. of them gave a positive reaction, whereas normals as a rule were negative. Hence it could be concluded that the extract contained some allergic substance and since extracts of pure capoc freshly bought in a shop were negative, we concluded that some change had taken place

in the capoc from the mattress sent to us from Amsterdam. As we thought it probable that this "change" was due to some living organism we took some of the capoc, moistened it with saline and put it in Petri dishes in the incubator at about 30° C. After a week we found small black spots on the capoc, which on investigation proved to be pure cultures of a mould, *Aspergillus fumigatus*. In order to prove that the allergic property of the capoc from Amsterdam was due to the presence of this mould we infected pure capoc with the mould, waited till large cultures had developed, and then made extracts and examined these on our asthmatics. They proved to be positive, whereas pure capoc—as related above—was, as a rule, negative.

In this way we had obtained undeniable proof that the presence of a certain mould fungus in some material (capoc), which was *per se* devoid of allergic properties, gave rise to the formation of allergic substances.

We now proceeded to investigate whether the fact discovered was only realized in exceptional conditions or whether it would prove to be of general importance. So we first examined capoc from mattresses from various houses in Holland and found that *Aspergillus fumigatus* and other moulds could very frequently be cultivated, further we found that other mould fungi, other kinds of aspergillus (*A. flavus*, *albus*, *nidulans*, *candidus*), of penicilium, of mucor and cladosporium and also bacterium subtilis could, under suitable conditions, form allergens. We found these moulds not only in bed material, but in dust from houses, in feathers from pillows, in carpets, in grain, straw, etc., etc.

It is known from the investigations of Cooke and Coca that "house dust" contains allergic substances which could not be identified with any of the known allergens, and it is almost certain that the action of house dust in this respect is due to the presence of mould allergens.

Although we found various fungi which could form allergens (not only the microorganisms cited but also larger forms of fungi) the most active ones discovered so far are species of aspergillus, either *Aspergillus fumigatus* or one of the closely related types. The fact that *Aspergillus fumigatus* acts so strongly as a producer of allergens

is interesting since this is practically the only mould of this group which plays a part in human pathology. Cases of aspergillosis due to infection of the lungs with *Aspergillus fumigatus* have been described² and the same disease is frequently seen in birds, especially in tropical countries. In these cases, however, the fungus enters the human or animal body and grows there, forming large areas of mycelium. In allergic diseases caused by climate-allergens the position is different. Microorganisms grow outside the body and form their allergic products there, which after being taken up by the air come in close contact with human beings and produce disease in certain predisposed (sensitized) persons.

So far we have found about twelve species of moulds which certainly may act as allergen producers, but of course there will exist a great number of others which may act in the same way, some of them may even have a stronger effect. The instances given only have the value of indicating "types". Certainly other forms of climate-allergens will be found in the near future.

So far the evidence we have given in favor of our conviction that mould fungi form allergens has been founded on the performance of skin reactions on allergic patients, but we are in a position to offer more convincing proof. In fact we have shown (1) That subcutaneous injections with mould extracts may produce general symptoms of illness in allergics and (2) that the serum of sensitive persons contains substances which may serve to transform this specific sensitiveness locally to normal persons.

SYMPTOMS AFTER SUBCUTANEOUS INJECTIONS OF MOULD EXTRACTS

The reactions which follow the subcutaneous injections of mould allergens are—as in the case of all other allergens—dependent on the size of the dose injected. Small doses have a beneficial influence on the allergic processes, larger doses may produce allergic symptoms. By small doses we mean dilutions between 1 10,000,000 and 1 1,000,000 of our standard extracts, whereas the 1 100,000 and 1 10,000 dilutions we consider as large doses.

If these large doses (or even much higher doses) are injected into normal persons or into animals they will produce no reaction

² L. RENON, "Étude sur l'aspergillose chez les animaux et chez l'homme," Paris, 1897. Fr. SAXER, "Pneumonomykosis aspergillina," Jena, 1900.

whatsoever. If, however, they are injected into allergies they may produce the following symptoms Sneezing, secretion of watery fluid from mucous membranes of nose and throat, headache, rise of temperature, general feeling of illness, attacks of asthma or eczema. As a rule the first symptoms are sneezing or in a more general way all manifestations of rhinitis. It occurs not infrequently that a relatively small dose which will act beneficially on the asthmatic process will also produce the first indications of a general reaction, and these first indications consist of rhinitis. The patient may then announce that his asthma is considerably better but that he has caught a "cold."

This "cold" and also the more severe reactions will usually last for four or five days after the injection, but if the injections are continued the general symptoms may persist for weeks and even months. In one case a girl was given—contrary to our instructions—too high a dose of mould extract once a week. For three months, that is during that entire period, she suffered from rhinitis and asthma every week during the four or five days following the injections. So it seems that immunity against these allergens is not easily obtained. This, of course, is in perfect harmony with the observation that asthmatics permanently in contact with active doses of these allergens practically never attain a spontaneous desensitization, and that this condition can only be arrived at by the injection of small subliminal doses.

PASSIVE TRANSFER OF SENSITIZATION

It has been shown by Frugoni, Prausnitz, Ramirez and others that usually the allergic condition may be transferred to normal persons by means of blood transfusion, but it was Prausnitz and Kustner⁸ who introduced the method of local transfer of sensitization which is so simple and devoid of any danger for the patients, that it may be used for routine examinations. Briefly described, the method is as follows. 0.1 c.c. of the serum of a patient suffering from hypersensitiveness against a certain allergen *A* is injected *intracutaneously* on the volar side of the arm of a normal person. After twenty-four hours 0.1 c.c. of an extract of allergen *A* is injected precisely into the same site, prepared by injection of serum. On the

⁸ PRAUSNITZ and KÜSTNER, "Studien über die Ueberempfindlichkeit," *Zentralblatt f. Bakteriologie I Abteilung originale*, vol 86, p 100, 1921

other arm of the same person 0.1 c.c. of allergen extract *A* is injected into an unprepared site. The first injection will produce a large wheal surrounded by a larger red area and the second (control) injection will be negative. This reaction is strongly specific, *i.e.*, the normal person will only react to the allergen or allergens against which the donor of the blood was hypersensitive, and not against other allergens. We have carefully investigated this point ourselves.⁴

Prausnitz's method has been used by us in experiments with the serum of allergics hypersensitive to mould extracts, and we were able to prove that in these cases also hypersensitiveness may easily be transferred from an allergic patient to a normal person, and—as has been stated—we found the reaction to be strictly specific.

In addition to this we found that often (not always) the blood of a person hypersensitive to mould allergens (or to other allergens) contains substances which are able to inhibit the action of the allergen. And also this reaction is strictly specific, *i.e.*, blood of a patient hypersensitive to an allergen *A* and not to an allergen *B* will only inhibit *A* and have no influence at all on *B*. The presence of these inhibiting substances, which might be called anti-allergens, together with the possibility of passive transfer of sensitization, are strong evidence that mould allergens act in allergic patients in precisely the same way as the known allergens (*e.g.*, horse dandruff extract). So we might consider the correctness of our conception of the influence and nature of climate diseases as definitely settled.⁵

There remained, however, still one other experiment to be made.

If our conception of the influence of climate-allergens is correct and if the beneficial influence of high mountain climate is due to the absence of climate-allergens in the air, it should be possible to realize in low countries the same conditions as prevail in high mountain air. I have already mentioned Turban's statistics of asthmatics in Davos. If asthmatics could live in our country in an atmosphere as free from

⁴ W. STORM VAN LEEUWEN and W. KREMER, *Zeitschr. f. Immunitätsforschung*, 1927.

⁵ We attach great importance to this experiment since it offers definite proof of the correctness of our views on the importance of moulds as allergen producers, and we will be glad to send small quantities of sterile serum from patients showing hypersensitiveness to moulds and small quantities of mould allergen extracts to any investigator who might care to repeat this experiment. The experiment is devoid of any danger to the person on whom it is practised.

climate-allergens as high mountain air, the statistical results should be the same as those published by Turban In my monograph on

FIG 1

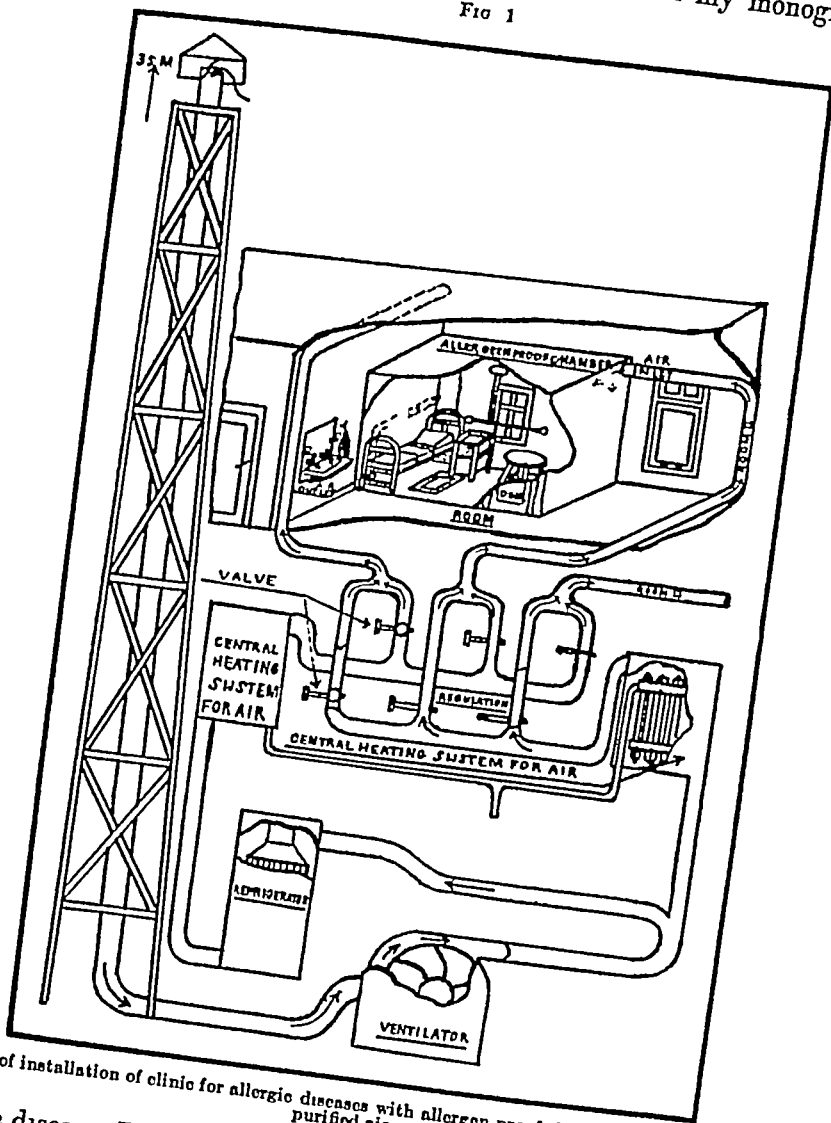
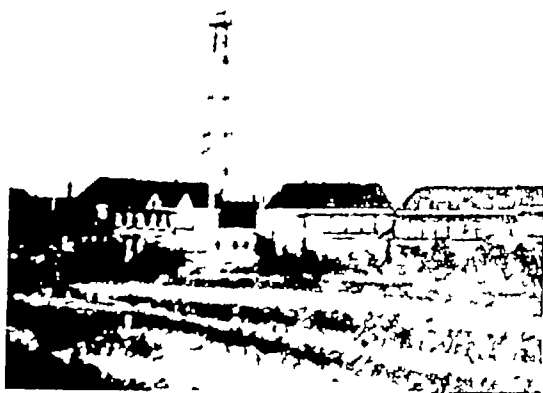


Diagram of installation of clinic for allergic diseases with allergen proof chambers ventilated with purified air

allergic diseases I have already mentioned our preliminary investigations of allergen-proof chambers Since that time we have been able—with the aid of Einthoven, Jr, who is an engineer—to work out the principle in an entirely satisfactory way

FIG 2



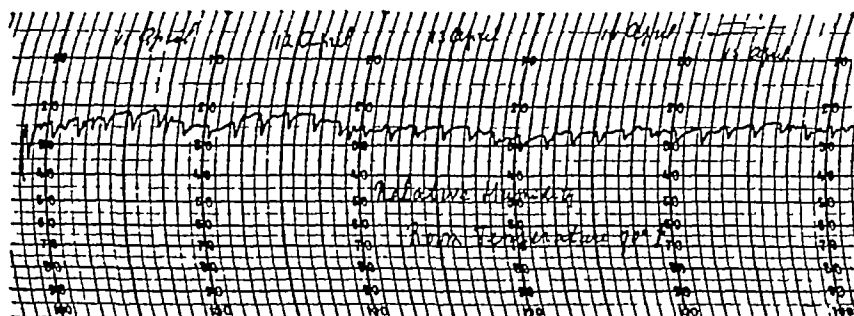
Reproduction of a photograph of the clinic for allergic diseases in Leiden Holland

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In one of the dampest regions of Holland we have rented two private houses, which are rather badly built and moist and which are situated near a canal and have another small canal right in front. In eight of the rooms of these houses we have constructed small chambers which have been made allergen-proof. These chambers accommodate sixteen patients, who can be admitted and cared for as in every other clinic, and who may stay during any length of time

FIG 3



Curve of relative humidity in allergen proof chamber on five consecutive days in April. Temperature in the chamber, 70° F

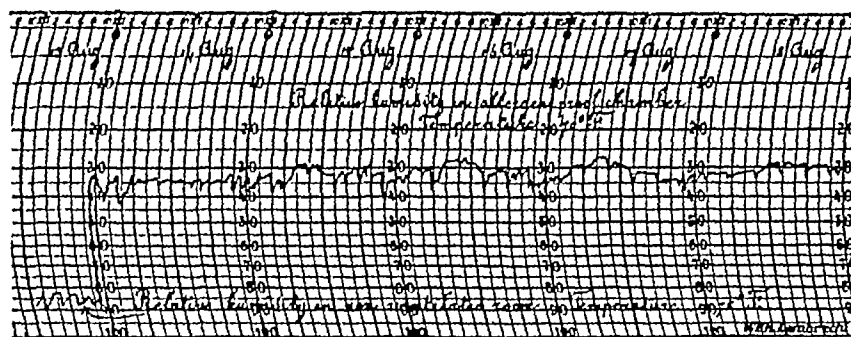
(days, weeks or months if necessary) in an atmosphere which consists of air either partly or practically entirely purified

Since this installation forms one of the main foundations of our treatment of allergics, it will be described in somewhat greater detail

The dimensions of most of the chambers which are put inside the ordinary rooms of the clinic are $2.5 \times 2.5 \times 3$ m and accommodate two patients. The walls, roof and floor of the chamber consist of an asbestos material (called eternite), they are painted and varnished and absolutely airtight. Each chamber contains only two iron beds, two iron tables, sterilized mattresses and bedclothes, nothing else. The patients undress in the ordinary room and enter the chamber clad only in their night-dresses. The ventilation of the chambers is accomplished by a large exhaustor which absorbs air from a wide tube, the top of which is 35 m above ground level. The exhaustor pumps the air in quantities of circa 50 cubic metres per minute into a system of tubes leading to the clinic. Each chamber gets in this way circa 3 cubic metres of fresh air per minute. In the centre of the house arrangements are made to heat the air before it enters the chambers,

also the pressure of the air is automatically regulated there. Before the tubes leading from the ventilator enter the house a side tube enters a cabin in which there is a large refrigerator (capacity 4000 calories per hour) The air passes the surface of this refrigerator (20 square metres) and is cooled to temperatures varying between -1°C and -15°C . In this way a great amount of condensation water is formed and this, of course, removes the greater part of all colloidal material which was present in the air. On leaving the

FIG. 4.



Curve of relative humidity in allergen-proof chamber on six consecutive days in August. Room temperature, 70°F

refrigerator the air is cold, dry and pure. Before entering the chambers it is reheated so that the relative humidity of the air is greatly diminished. By means of a special device we can—by simply turning a couple of handles—determine which chambers will be ventilated by relatively pure air (absorbed from a height of 35 m) and which chambers will have the air which has undergone the additional process of drying and purifying. It is clear that a system as described here could only run uninterruptedly for a few hours, since the condensation water cooled to -0°C will form a layer of ice on the surface of the refrigerator which would after some time obstruct the passage of air. Consequently the refrigerator is stopped automatically by means of an electric clock every four or six hours, at the same time a number of electrical heating bodies are connected up so as to heat the current of air which thaws the ice and as soon as the temperature in the inside of the refrigerator reaches $+1^{\circ}\text{C}$ the machine starts automatically and the heating bodies are disconnected.

During the period of thawing, the air which passes the surface

of the refrigerator will be wet and contain a large quantity of allergens, so that it would spoil the atmosphere in the allergen-proof chambers, consequently in one of the tubes leading to the chambers a valve opens automatically to let the air escape during the thawing period, and as soon as that period is finished this valve closes automatically again. All these arrangements, the details of which cannot be related here, have been worked out in a very satisfactory manner by Einthoven, Jr. Fig 1 gives a diagram of our installation and Fig 2 a photograph of the clinic, whereas Figs 3 and 4 represent the curves of relative humidity taken in one of the allergen-proof chambers during a period of a week. The temperature in the chamber was kept at ca 70° F. It may be mentioned incidentally that the relative humidity in all low countries in our latitudes varies from 50–100 per cent, that the *average* humidity of high altitude resorts is as a rule higher than our figures (although during part of the year they may be somewhat lower) and that the relative humidity in the Sahara is higher than 20 per cent.

For the sake of exactness it must be remembered that we do not lay very great stress on the dryness of the air in the treatment of allergies (although it may serve quite well in cases with profuse sputum, bronchiectasis and of other diseases like nephritis) but that in our case dryness is an indication of *purity*.

RESULTS OF TREATMENT IN ALLERGEN-PROOF CHAMBERS

Statistical data on the influence of residence in allergen-proof chambers obtained from the first eighty patients who were admitted to the clinic have been published by Doctor Kremer and myself.⁶ We found that 74 per cent of our patients practically got rid of their asthmatic symptoms within two or three days after admission, 16 per cent. were distinctly ameliorated within two or three weeks, and 10 per cent remained uninfluenced. The total number of patients treated in the clinic up to date exceeds 300 and since our first publication our results have undergone a slight improvement.

If our results are compared with those obtained in Davos one finds as much agreement as could be expected.

⁶ W. STORM VAN LEEUWEN and W. KREMER, "Die Resultate der Behandlung des Asthma bronchiale im allergenfreiem Zimmer," *Klin. Wochenschr.*, 5 Jurg, Nr 10, 1926.

In judging the value of our figures it must be remembered that they represent only the state of the patient during his residence in the clinic, and that they do not give an indication of the *final* result of treatment. Of course an asthmatic cannot be "cured" by keeping him in a clinic for some weeks, consequently after leaving the allergen-proof chamber he will be in the same condition as before. In this respect also high altitude and allergen-proof chambers act in an analogous way. Residence in high altitudes gives temporary relief but does not effect a cure of the patient.

So it might be asked, what is the use of taking these asthmatic patients into the clinic for two or three weeks?

We admit these patients to the clinic first of all to obtain definite proof that climatic factors are active in their cases. Of course skin reactions often give indications on this point, but the fact that attacks disappear or diminish considerably after staying for some days in the clinic gives unequivocal proof of the influence of climatic factors and allows us to estimate the degree of this influence. It is clear that such an indication of the nature of the disease can only be ascertained in so short a time if the patient had continuous asthmatic symptoms during the period preceding his admission. We have made it a rule to take into our allergen-proof chambers only such persons as show definite symptoms at that moment.

The chief benefit to the patient of residence in an allergen-proof room then is diagnostic, since it teaches us whether or not factors of climate are active in his case and also we are able to judge in a relatively short time to what degree improvement of the case is possible if at all. In some cases of very severe character the admission to an allergen-proof chamber is made with the definite aim of obtaining temporary relief in order to gain time to decide what may be done for the patient in the future. In addition to that we have during the period of two or three weeks of the patient's stay in the clinic an opportunity of determining the kind and the dosage of the allergens with which he will be treated afterwards.

Although it is true that the advantages of residence in the clinic are for the most part of a diagnostic character, it must not be forgotten that for a number of patients this residence may have very potent therapeutic consequences, since in all cases in which strong climate factors are present we try to change the conditions in the

patient's home so as to make them as similar to the conditions in the clinic as is possible. With regard to this point it is of great advantage that our clinic has been established in a couple of old private houses built on a very moist soil with a high level of ground water, so that it is practically certain that a patient who is free of attacks in our clinic will be also without asthmatic symptoms at home if he has an allergen-proof chamber installed in his bedroom.

The principle of introducing allergen-proof chambers in private houses has been realized in the houses of about thirty-five patients in Holland and Germany. In twenty-five cases the result has been perfect, *i e.*, the condition of the patient at home is now as it was during his residence in the clinic, in three cases the result is not so good as it might have been and in three cases the result is poor. These failures are partly to be ascribed to technical mistakes in the construction, partly to unfavorable psychic influences at home.

In estimating the value of this method of treatment in allergen-proof chambers at home it should be realized that the patients can obtain relief by this method without staying in their allergen-proof chambers day and night. Of course this fact could not have been anticipated by us, but as soon as the first climate cases had entered the clinic we observed that after having stayed in their chamber for two or three days they could be allowed to go out for one or two hours a day and this time could be quickly increased so that, as a rule, after one or two weeks they could be kept free from attacks if they were in their chamber only during the night. In the daytime they could go out and visit their home or other private houses. Consequently the patients who have obtained complete or nearly complete relief by having an allergen-free chamber at home, only use this chamber for sleeping and are able to lead an almost, or entirely, normal life during the daytime. Fig 5 is a diagram of the arrangement of an allergen-proof chamber in a private house, whereas Figs 6, 7, 8 and 9 represent photographs of one of the arrangements in a private house.

In my description of the clinic it has been mentioned that we have two systems of ventilation, the outside air and the purified air. At the beginning of our work we did not know what percentage of patients would want purified air and for what percentage of them outside air would be sufficient. Fortunately it soon appeared that for

practically all patients who were benefited by residence in the clinic at all, the simple method of ventilation was sufficient. This fact is of great importance, as the realization in a private house of an allergen-proof chamber with air purified by cooling is a very costly affair, whereas the simple method is obtainable for quite a number of patients.

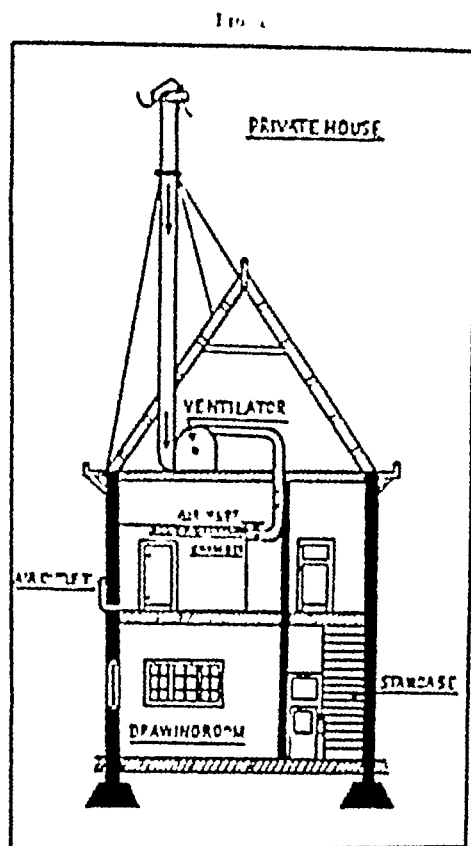


Diagram of installation of allergen proof chamber in a private house

We have then—as may be clear from the preceding narrative—reduced the treatment of climate-allergy to a purely technical problem. The best solution of the problem is the installation of an allergen-proof chamber in the patient's house, but of course quite a number of patients cannot afford the expense. These patients must adopt the next best method. They are advised to have a new mattress and pillows made from pure and fresh capoe, these mattresses and pillows and also their bed furniture have to be disinfected three or four times a year. Everything which could offer good conditions for the growth of moulds must be removed from the

sleeping-room. This room is heated during the winter (a proceeding which most people in Holland consider unhealthy).

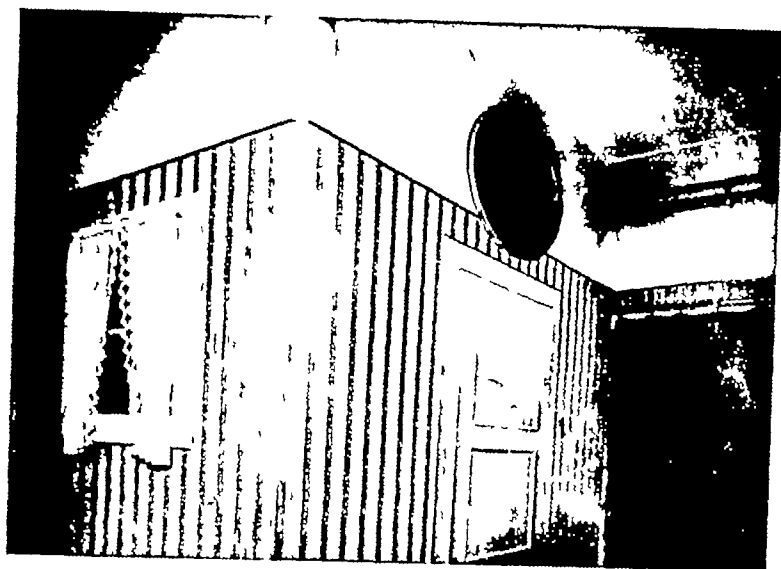
In this way the condition of many patients has been improved. In many cases, however, these simple measures are not sufficient, since the house contains too many climate-allergens, if, then, the patient cannot afford the installation of an allergen-proof chamber, he will have to be treated by the ordinary methods of anti-allergic

FIG 6



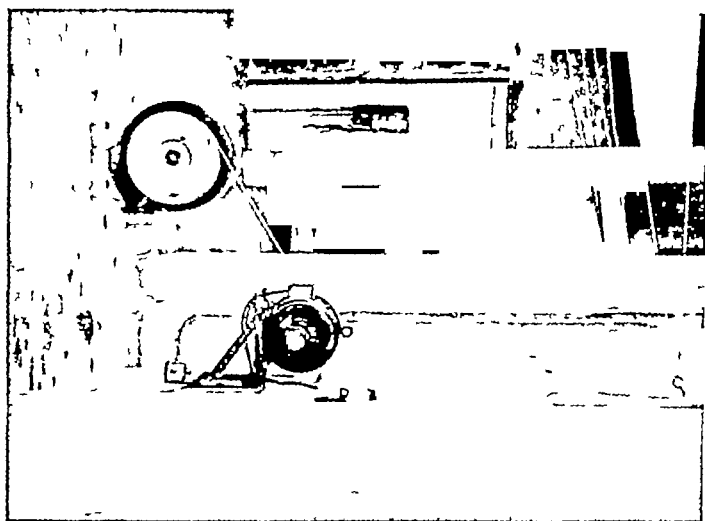
A private house with allergen proof chamber Notice tube on roof
(Obtained by the kindness of Mr Bieber)

FIG 7



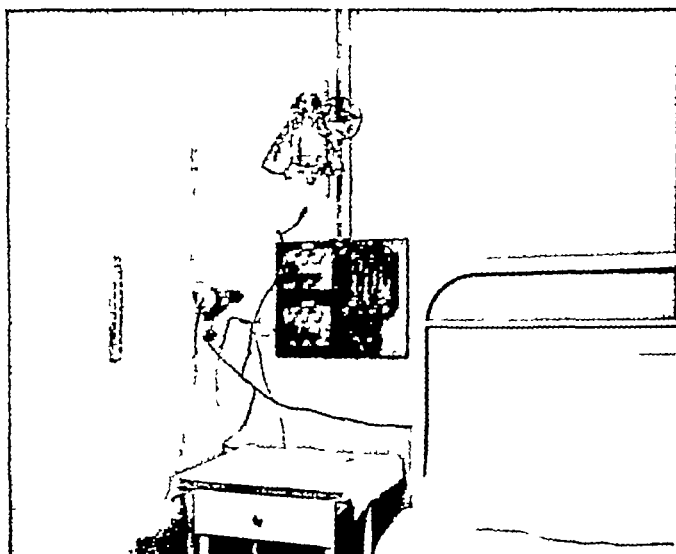
Allergen-proof chamber placed in the patient's bedroom

FIG 8



Exhauster on the top floor of the patient's house

FIG 9



From his bed the patient can regulate the light the motor and the heating of the air

therapy In our monograph on allergic diseases we have fully described the methods we use for specific and non-specific desensitization Tuberculin treatment—which is intermediate between specific and non-specific therapy—is still one of our most important routine methods, in non-specific treatment we have replaced our milk injections by injections with a solution of sulphur in oil (as used in treatment of rheumatism) The scope of our specific treatment has been considerably enlarged during recent years since we have found so many patients to be sensitive against mould extracts These extracts are used now on a large scale for specific desensitization—for the most part along with tuberculin treatment—and give this treatment good and highly interesting results

APPLICATION OF THE PRINCIPLE OF ALLERGEN-PROOF CHAMBERS TO OTHER DISEASES

Asthma and allergic eczema were the most important diseases to which the principle of the allergen-proof chamber was applied from the beginning Some cases of urticaria due to climate-allergens may be mentioned incidentally But we soon realized that other diseases known to be influenced by climatic factors would repay study Among these diseases we have been interested in migraine and rheumatism, but we have not yet been able to investigate them thoroughly Two other diseases, however, have been tried and have given results worth mentioning These are whooping cough and tuberculosis

Results with Whooping Cough—We had the opportunity of treating only five cases of whooping cough, but the results were so clear that they are worth mentioning The ages of these patients were one, two and a half, three, five and six years Immediately before entering the clinic they had very frequent and violent attacks, at least one attack in every one or two hours They were admitted to the clinic on the sixteenth, tenth, fourteenth, twentieth and twenty-third day of their illness Four children came from home and one was sent to us from the pædiatric clinic. The first four children had been carefully watched at home, the parents had made a list of attacks and had taken the temperature

The children were, immediately after admittance to the clinic, put in an allergen-proof chamber ventilated with purified air None

of them had a single severe attack in the clinic. Slight attacks to the maximum of six a day persisted for some days but gradually decreased in frequency, so that the children were free of attacks of whooping cough on the fourth, tenth, eighth, fifth and second day after admission, *i e.*, 20, 20, 22, 26 and 25 days after the beginning of the disease. No medicaments were given in the clinic. After the attacks of coughing had ceased they did not return as long as the child stayed in the chamber. Child No. 4 was sent home on the twenty-ninth day of the disease and had some attacks there during the next three days. Child No. 1 (two and a half years old), who had been sent to us from the paediatric clinic, was sent back there after she had been completely free in our clinic for two days. This was done in order to make sure whether the freedom of attacks was really due to the residence in our chamber. She then had attacks in the paediatric clinic for a week and was then free of them.

The fact that change of air is beneficial in whooping cough has been known for a long time. We have now shown that "change of air" may be realized by moving from one house to another in the same town (all the children lived in Leiden) if only certain technical devices are installed.

When we state that severe attacks of whooping cough ceased at once in our allergen-proof chambers, we do not wish it to be supposed that we consider whooping cough to be an allergic disease. As a matter of fact we are not able to give any explanation for the quick disappearance of whooping cough in our chambers, and I must content myself with simply offering the facts as they have been observed. They seem to me to be of great practical and theoretical importance.

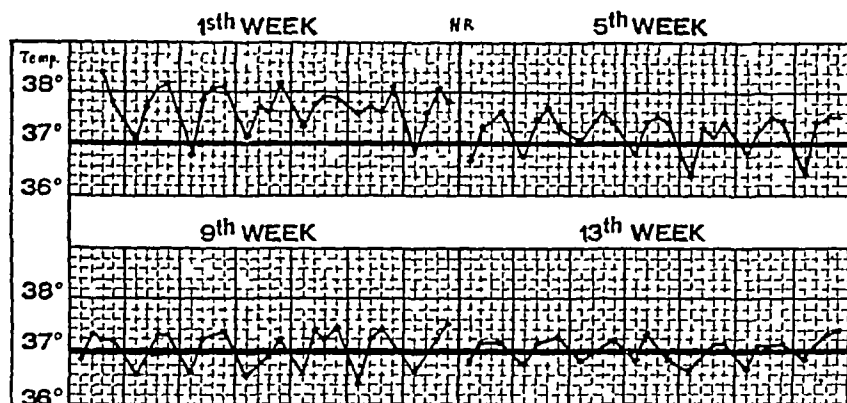
Tuberculosis—At first sight it might seem strange that we tried to apply the same method of treatment to diseases which show so many differences *inter se* as asthma and tuberculosis. Early in our investigations on mould extracts we had found that tuberculous people showed more positive skin reactions with mould extracts than normal people did, and furthermore it is known that climates which are good or bad for tuberculosis are also good or bad for asthma and *vice versa*. Besides that we took into consideration the fact that after all a tuberculous patient is an individual who has, at some period of his life, become sensitized to some allergen (tuberculin). Why then, it might be asked, should not he have become sensitized during that

same period to other allergens which came in contact with his mucous membranes at that time?

Such were the considerations which led us to investigate the influence of allergen-free air on cases of tuberculosis

We have up till now treated fifteen cases of tuberculosis in our clinic Two of these cases had asthma as well as tuberculosis These, of course, did extremely well in allergen-proof chambers since their

FIG 10



Temperature curve of a severe case of tuberculosis treated in allergen proof chamber

asthmatic attacks ceased, and consequently the tuberculous process got a chance to heal

Two patients had only slight tuberculous infections (one was practically convalescent), they stayed for six weeks and four months, respectively, and did very well

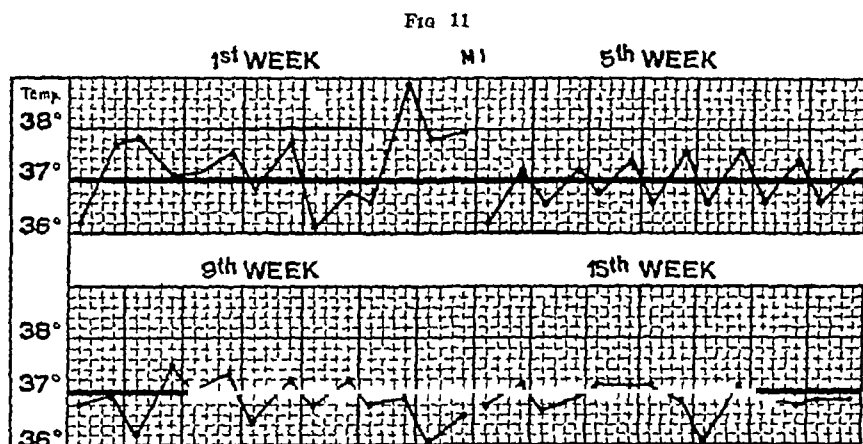
These four cases, then, improved quickly and considerably in the clinic, but they are not interesting from the point of view of the treatment of severe tuberculosis. The remaining eleven cases, however, are all suitable for the demonstration of the action of allergen-free air on the course of tuberculosis

Of these eleven cases two did not improve in the clinic for reasons unknown One of them was a girl fifteen years old with a slight infection of the left apex. She improved a little during the first two months, but after that grew worse, finally she became homesick and had to be sent home The other one was a very severe case of tuberculosis of both lungs, with a high temperature, who left the clinic after four months only slightly improved

A girl of twenty-seven years who had a large cavity in the left lung did not show definite signs of improvement, although she gained considerably in weight (12 kg)

The remaining eight patients, all of them severe cases of tuberculosis, seven of them producing sputum with abundant tubercle bacillus, all improved considerably and it is worth while to consider whereof this improvement consisted

The first sign of improvement in our tuberculous cases was their



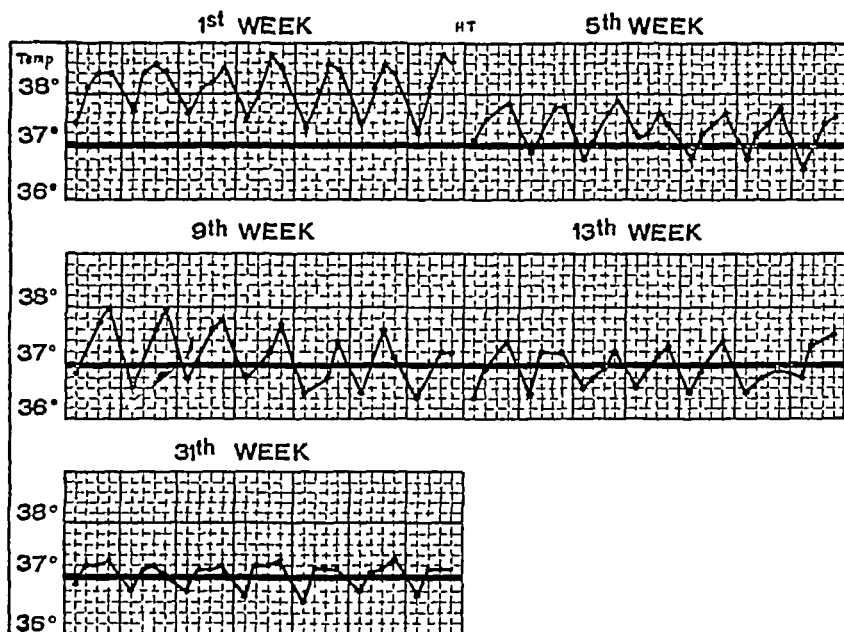
Temperature curve of a severe case of tuberculosis treated in allergen proof chamber

spontaneous announcement that they breathed easier and coughed less. This improvement showed itself in one or two days after admission. Sometimes the amount of sputum diminished along with the diminution of coughing, in one case the quantity of sputum produced per day was reduced to 50 per cent within two days. But in some of the cases with large cavities the quantity of sputum remained the same although coughing was greatly reduced. The influence of allergen-free air on the quantity of sputum was especially interesting in two cases, both having a cavity (controlled by Rontgen-ray examination). The first of these cases was a woman of forty years, with a large cavity. She produced considerable amounts of sputum before entering the clinic and was absolutely free from sputum after three weeks. The second case had a small cavity, during the preceding two years she generally produced 35 c.c. of sputum daily. In Davos this amount had been reduced to 15 c.c. in half a year. After coming back to Holland it increased again to about 35

c c, but diminished in the clinic to 15 c c within six weeks. This patient then had an allergen-proof installation fixed up in her own house. She improved considerably, her quantity of sputum going down within some months to 6 c c. daily.

The body-weight of all these patients increased in the clinic. This, of course, is not a very important fact since most methods of treatment of tuberculosis give this result. The interesting point in it,

FIG 12



Temperature curve of a severe case of tuberculosis treated in allergen-proof chamber

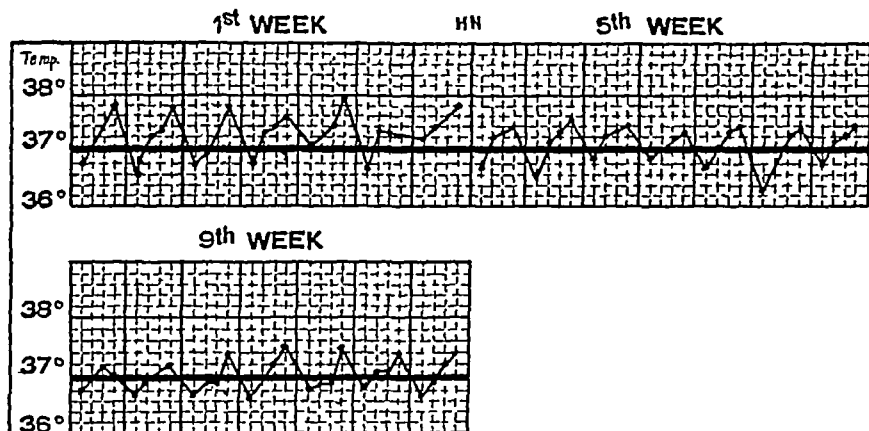
however, is that many patients gained 1.5 to 2 kg in weight during the first fortnight or even during the first week of their residence in the clinic. All these patients had had rest, good food and good care before coming to us, the only thing which was changed was the air, hence the improvement must be ascribed to the improvement of "climate" conditions. It may be remarked that we have often seen these sudden increases in weight in our clinic in cases of climate-asthma.

In all patients who had supranormal temperatures on admission (eight), the temperature decreased gradually in the clinic. This

decrease as a rule sets in after two or three weeks. Figs 10, 11, 12 and 13 give curves of the temperature during the first week, the fifth week, the ninth week and the thirteenth week after admission of three of our severest cases of tuberculosis.

The improvement in the patient's condition could not be expected to show itself in physical examination of the lungs before some weeks had elapsed, but after two or three weeks we found definite signs of

Fig 13



Temperature curve of a severe case of tuberculosis treated in allergen-proof chamber

diminution of exudative processes and the occurrence of signs of cicatrization instead.

Summarizing, it may be stated that of fifteen patients suffering from tuberculosis, twelve improved definitely. Of these twelve patients two were suffering from asthma along with the tuberculosis, and two were light cases of tuberculosis. The other nine were severe cases.

The improvement in these patients' conditions consisted of greater ease of breathing, less coughing, decrease of temperature, increase in weight, often diminution of signs of exudative tuberculosis and increasing signs of proliferation.

Before considering the interest of these improvements something more must be said about the condition of our eight severe cases in the period directly preceding admission.

Seven of them had fever, the maximum temperature varying from 38° C to 39° C. One had subfebrile and one had normal

temperature. Seven patients had cavities, seven patients produced sputum daily in quantities varying from 35 c c to 200 c c. These sputa contained abundant tubercle bacilli

In seven patients there were definite signs of an exudative process. Four patients had been in bed at home in the months preceding the admission, three had been in other hospitals where they had gone through a rest cure lasting several months. In two of these patients the consulting physician had judged their condition too unfavorable to allow them to go to a sanatorium.

It may safely be stated that all patients had obtained, during the period preceding admission, rest, excellent food and good care. Only two of them—being housewives—found quieter surroundings in the clinic than they had enjoyed at home, but apart from this, for all the patients the transference to the allergen-proof chambers of our clinic only meant residence in allergen-free air. It may be remembered that the sanitary conditions of the building in which our clinic is housed are unfavorable since it is rather badly constructed and situated in a moist, damp region.

* * *

In judging our results in the treatment of tuberculosis of the lungs some points have to be considered.

First. It should be mentioned that during their residence in the clinic these patients obtained no other treatment at all. The food given to them was the same which all other patients got, they were given three-quarters of a litre of milk a day and some cod-liver oil. No medicaments were prescribed, only two patients who were accustomed to take sedatives at home were allowed to continue this in the clinic, but always in smaller quantities than at home.

Second. I have in the preceding pages spoken of "improvement in the patients' conditions" but not of a "cure". Of course in a chronic disease like tuberculosis a definite cure will never be achieved in a relatively short period, and the ultimate result of any form of treatment may only be judged after several years. As a matter of fact, we were in our clinical experiments interested primarily in the condition of the patient *during his residence in the clinic*.

We all know that some climates are better for tuberculosis than others. We all know that some houses are bad and unhealthy and

other houses are good and healthy. It was our chief aim to investigate this peculiar factor of climate. We wanted to know wherein this influence of climate and of "good" and "bad" houses existed, and this our clinical experiment could teach us.

To make this point of view clearer it may be remembered that also in the case of asthma we do not obtain a *cure* by keeping a patient in the clinic. We simply want to find out how the conditions in a house in our country must be changed to make them as favorable as possible for these patients and it is precisely the same thing we wanted to achieve for tuberculosis.

Of course there are great differences between asthma and tuberculosis. In cases of climate-asthma the factors which cause the symptoms of the illness are exogenetic (climate-allergens), in tuberculosis there is first of all an endogenetic cause, *viz*, the infection with the tubercle bacillus, but next to that there are exogenetic causes similar to those of asthma, and these causes may be eliminated, as has been proved in our clinical experiments. Hence the degree to which the patients will improve in the clinic is not dependent so much on the patient's health at the moment or on the extent of his tuberculous infection, as on the degree of his hypersensitiveness to mould-allergens (or climate-allergens generally). Indeed, one of our patients who came into the clinic in a deplorable condition, and who improved to an unexpected degree in a short time, ultimately died. This only proved that his strength was not sufficient to compete with the tubercle bacillus. Had he been taken to the clinic in an earlier state, he would probably have been cured. Of course this example is an exception. As a rule those patients who are benefited considerably by allergen-free air will thereby gain the strength necessary for definite improvement.

Two of our patients, who had in a short time improved very much in the allergen-proof chambers, left the clinic against our advice too early, *i e*, before they were cured. One of them remained well at home for more than a year, and then gradually grew worse. But the other one was unfavorably influenced by residence at home within a week, in fact his condition rapidly got worse and everything which had been gained in months was lost in some weeks. This patient had undertaken on his own responsibility the part of the clinical experi-

ment which we would not have dared to propose. At home he had been very ill, in the clinic he improved rapidly (temperature curve, Fig 12), but after returning home he very rapidly became ill again (although he could have as much rest and good food at home as he wanted). Certainly in this case the factor of "environment" was extremely active. This man had had eight brothers. They had all died of tuberculosis in the same house. This example proves among other things how much the ultimate result of any treatment of tuberculosis is dependent on the conditions which prevail in the house in which the patient will have to live afterwards.

It is an undeniable fact that there is a relation between climate and tuberculosis morbidity. He who can still doubt this should consult Gordon's observations on the influence of strong rain-bearing winds on the occurrence of tuberculosis.

Part of these differences in the morbidity and mortality of tuberculosis in different regions may be due to lack of good food, unfavorable conditions in factories or working places and similar factors, but if we are to have a complete account of the etiology of tuberculosis other factors will have to be considered, and one of these is the presence or absence of climate-allergens in the environment.

The knowledge of this factor is important not only from the point of view of the treatment of tuberculosis but also for *prophylaxis*. *Preventive medicine should take this matter into consideration.* If the simple transfer of a patient from one house to another in the same town or region may make all the difference to his health (as was the case with patients coming to our allergen-proof chambers) it must be realized that the obvious thing to do in prevention of tuberculosis, is To try to make the conditions in the patient's home similar to those which prevail in our allergen-proof chambers. Considering the results obtained in our clinical experiment we feel that for all patients belonging to the same group as those who were beneficially influenced by residence in allergen-free chambers the problem of their health has for the most part been reduced to a problem of technic and money. Technical difficulties are practically solved, and hence the main problem to be faced is the financial one.

Of course there is nothing new in the statement that if every one could afford to live in a well-built, well-ventilated and well-heated

house, situated in a favorable region, the morbidity of tuberculosis would be greatly reduced. What we wanted to show, however, is *that the difference between a bad house and a good house consists for the most part in factors which may be eliminated by relatively simple methods. One of the chief aims of preventive medicine of tuberculosis will have to be. To exclude climate-allergens from the direct environment of persons menaced with tuberculosis.* The principles of the methods which should be used in this work are the same as those proposed by us in the fight against asthma, as has been mentioned in a preceding section of this paper.

A HEART-BLOCK CLINIC

By LOUIS FAUGERES BISHOP, M.A., M.D., D.Sc., F.A.C.P.

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I wish to present in this paper a summary of the case histories of twelve examples of heart-block which have come under observation in my practice during the past few years

Heart-block is not a very common form of cardiac arrhythmia, but it is an important one, and if suspected its presence or absence should be confirmed by a careful technical examination. It is only by such examinations that the true nature of these cases comes to light, a person may have a slow pulse and be in perfectly good health otherwise, but upon electrocardiographic examination we discover the presence of a definite heart-block and it makes a good deal of difference in our management of the situation whether we are dealing with a simple bradycardia or an actual block

There are two main varieties of heart-block, partial and complete. Partial heart-block may be subdivided into two types, namely, a prolongation of the conduction time between the auricles and ventricles or a dropping out of occasional beats. In complete heart-block we have a total dissociation between the action of the auricles and the ventricles which ultimately develop a rhythm of their own, there being no determinable relationship between the auricular and the ventricular systoles. The mechanism of heart-block involves some form of hindrance in the conduction of the impulses through the specialized conduction system of the heart, the particular part involved being the auriculo-ventricular node and the bundle of His. If, for example, some toxic condition affects this conduction system by reducing its irritability, it is easy to understand how we might get a prolongation of the conduction time between the auricle and ventricle, or, as seen in the electrocardiogram, a prolonged *P-R* interval. If the auriculo-ventricular node or the bundle of His be greatly depressed by an actual lesion one can understand how we might get dropping out of beats. And if this lesion is severe enough we get a complete blocking of the impulses between the auricles and ventricles

Syphilis is a very common cause of heart-block and must always be excluded as a possible factor

Digitalis, in certain people, will sometimes cause temporary block and in a person receiving large doses of this drug continuously the physician must be on the lookout for this untoward effect. Vascular lesions involving the blood-supply to the bundle and node may cause heart-block, due to a temporary anæmia. In this connection it might be interesting to mention a case personally explained to me by Professor Geraudel, working in the clinic of Vaquez at La Pitié Hospital in Paris. It was a middle-aged man who, from time to time, showed a partial heart-block in the electrocardiogram, and then would have a normal picture for a period of several months at a time. During the time he had the block he suffered from dizziness and occasional fainting spells. In between times he had no symptoms whatsoever. Finally the man died and the body was brought to the post-mortem room. A very careful pathological examination of the heart was made and it was discovered that there was a small ball-valve thrombus in one of the branches of the coronary arteries which supplied the bundle of His and the auriculo-ventricular node. What apparently happened in this instance was that at times the circulation to the node was perfectly free and at other times the thrombus would alter the blood-supply, which caused the heart-block.

Again, heart-block occurs occasionally in cases of arteriosclerosis or cardiosclerosis in elderly people and also during the course of some infectious disease. In the tropics we are told that malaria will sometimes cause a heart-block by plugging up of a blood-vessel to the conduction tissues.

The treatment of heart-block resolves itself down to the adoption of general hygienic measures on the part of the patient, the use of a few-protein diet, if indicated, and the insistence upon good elimination of both the bowels and the kidneys. If syphilis is present anti-luetic measures must, of course, be instituted. There is no specific remedy for this malady, but occasionally barium chloride has had certain good effects in Stokes-Adams disease by increasing the irritability of the ventricle. Adrenalin hypodermatically is indicated in Stokes-Adams disease.

Symptoms of heart-block are rather obscure, outside of the usual slow pulse, but occasionally people complain of pain, dyspnœa and

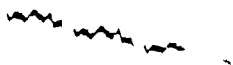
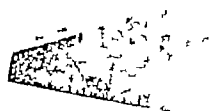
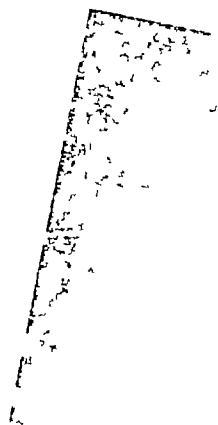
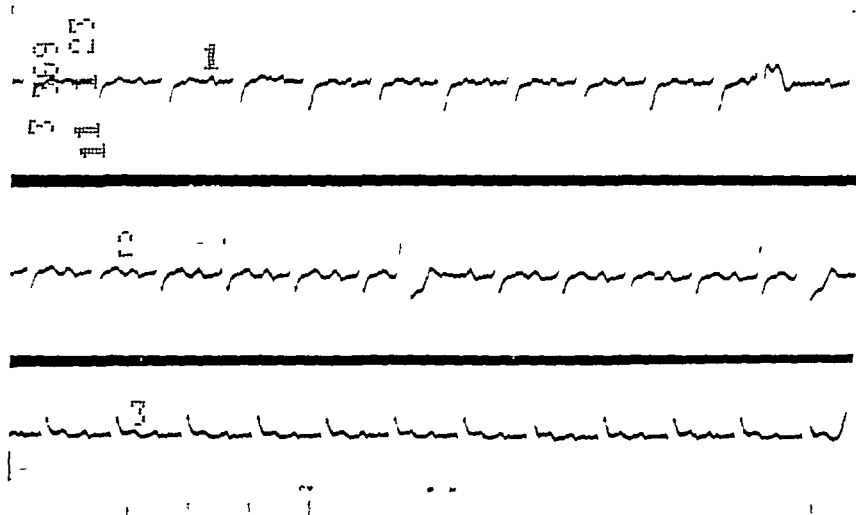


FIG 3



Orthodiagram of B B H M taken November 1 1923. This is taken with patient leaning forward and slightly rotated

FIG 4



Electrocardiogram of B B H M taken November 1 1923 showing prolonged *P-R* interval, left ventricular preponderance and right ventricular extrasystoles

dizziness In complete heart-block with a very slow ventricular rate a typical Stokes-Adams attack may supervene with transitory syncope due to a temporary anæmia of the higher nerve-centres This is often a very grave condition

CASE HISTORIES

Mr B M P P came to me in 1925 complaining of pain in the front of his chest on exertion and when he stood up for any length of time He was in bad condition, showing marked signs of decompensation characterized by general anasarca He had had this condition before and it had yielded to digitalis He was fifty six years old and stated that his father was living and well at the age of eighty two, but his mother had died at seventy-eight of old age His wife was living and well He had four sons and one grandchild, three brothers living and well and one sister He had always been well until three years ago, though he had been subject to tonsillitis all his life

For three years he had had pain referred to the heart, and shortness of breath when he exerted himself There was no history of a sudden onset of these symptoms

Examination of the urine did not reveal any impairment in the kidneys His blood Wassermann was negative Red cells were 6,500,000 Hemoglobin, 95 per cent

The orthodiagram showed a heart moderately hypertrophied Electrocardiogram showed a right preponderance and a lengthened *PR* interval

Physical examination revealed a well-developed, well nourished man Examination of teeth showed many capped in the lower jaw The upper teeth being replaced by a plate The heart showed a systolic blow and a definite pre systolic murmur The liver was large and tender The man's general condition impressed one as being very poor The electrocardiogram showing a marked right preponderance, together with the shape of the heart, gives evidence that Mr P had been suffering from mitral stenosis for a number of years previous to the development of his heart block

Pain with mitral disease is not uncommon even in the absence of heart block His pressure was very low, diastolic 80, systolic 100, showing a marked contrast to most of the people described in this clinic.

Mr B B H. M. came to us in 1923 complaining of a pain of moderate severity confined to the front of the chest and radiating to both arms as far as the elbows He also had noticed that his heart missed beats He stated that his father had died at eighty six of old age, but that his mother was living and well He had two children and five grandchildren One brother had gall bladder trouble He had always been well except for an attack of malaria he had one time and a tendency to chronic bronchitis

Four years previously, while eating breakfast, he had a sudden attack of severe pain in the chest, which was accompanied by vomiting Since then he has had a tendency to pain in the chest, front and back, extending to the arms, but also sometimes going to the forearms The pain was always made worse by exertion.

His blood pressure was 130 diastolic and 220 systolic at the first observation Subsequent observation a few days later showed the diastolic 100 and systolic 170

Mr M. was a large, stout man, weighing 210 pounds, five feet ten inches tall, with no bad habits. Urine showed a specific gravity of 1024 with faint traces of albumin, but no casts. Wassermann was negative. Blood showed 6,000,000 red cells and 90 per cent hemoglobin. Coagulation time was two minutes.

From the history we may infer that he had suffered some accident to his cardiac circulation some years previously. The damage there had persisted and resulted in scar-tissue which was the foundation of his pain and was revealed by unusually long *P-R* intervals in the electrocardiogram. We had him under observation for only a short time when he went to Florida for the winter.

Electrocardiogram shows also the presence of extrasystoles having their origin in the right ventricle, and the very high voltage so often seen in those individuals with large hearts and high blood pressure.

Mr B F M S first consulted me in the summer of 1923 after having been to many different physicians, both in this country and in France, relative to his cardiac condition. He was suffering from myocarditis, cardiac hypertrophy, aortic insufficiency and parenchymatous nephritis. His chief complaint was attacks of shortness of breath, especially at night, and intense apprehension and nervousness about his condition.

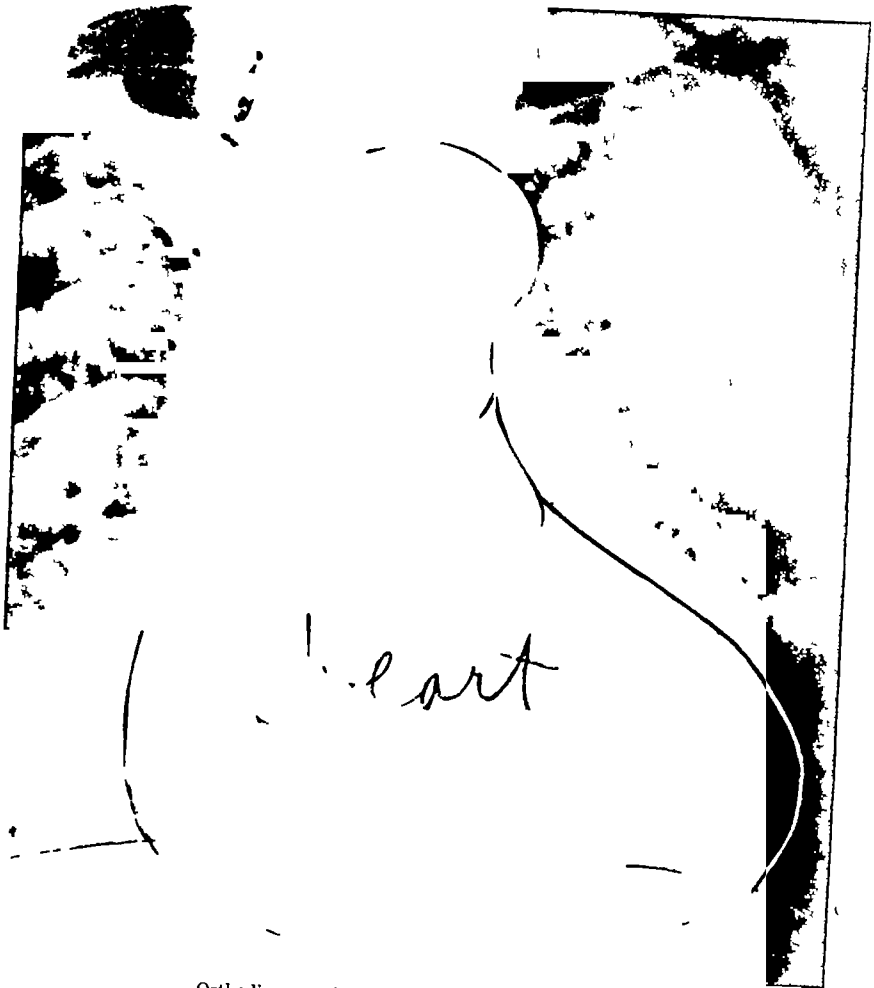
Years previously he had contracted syphilis for which he had been treated.

Physical examination showed a large, well developed man of sixty with a very large over acting heart with systolic and diastolic murmurs. Blood pressure, 170/60.

Orthodiagram showed a cardiac hypertrophy with widening of the aortic arch. Electrocardiogram showed a marked left ventricular predominance, notching, a slight widening of the *QRS* complexes, negative *T* wave in lead 1, and a *P-R* interval of 0.24 second, which, of course, is prolonged above the normal. The urine showed signs of a chronic parenchymatous nephritis, with high specific gravity, albumin and casts. The blood count was normal and the Wassermann negative.

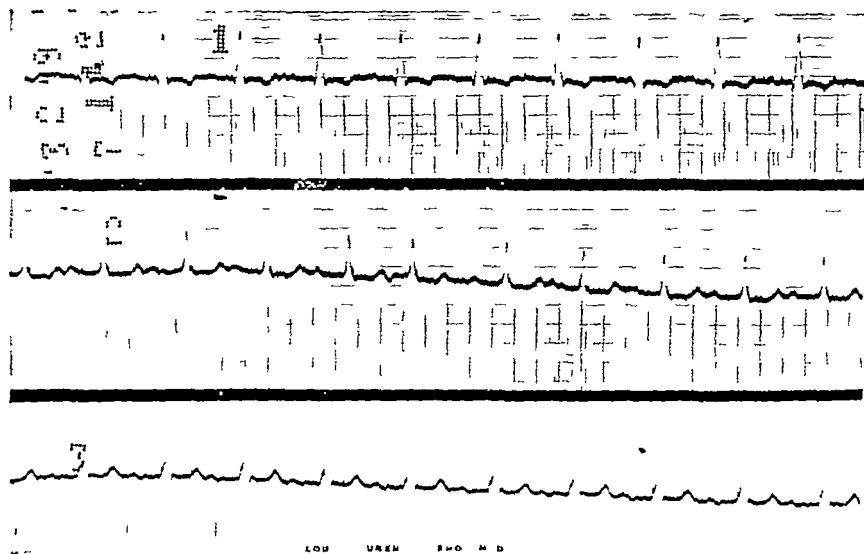
The patient could not take digitalis and was therefore put on small doses of ouabaine, theobromine, and the regular use of castor oil. He improved somewhat and in the summer of 1924 went to Watkins Glen, in New York State, for a rest cure. Returning to the city in September of that year, he collapsed in the railroad station upon arrival and was taken to his home in an ambulance, where he was immediately seen by my associate. From that time on he was under our constant care for about nine months. Following the collapse he was placed on a little more strict regimen, kept in bed, alternating with a chair, and in about a month showed considerable improvement, enough so that he could go out with a nurse and attend the card club of which he was a member, taking active part in many interesting games of pinochle, in which art he was an expert. In the early part of 1925 Mr B F M S had another attack of decompensation, ushered in almost immediately by edema of the lungs. He was put to bed, kept on a few protein diet, given ouabaine, and, on account of rapidly developing general anasarca of the extremities, was given large doses of theobromine, alternating with theocine. For the next five months his course was stormy, to say the least, there being many untoward and dramatic manifestations with innumerable attacks of edema of the lungs, and about three definite uræmic con-

Fig 5



Orthodiagram of B F M S taken July 11 1923

FIG 6



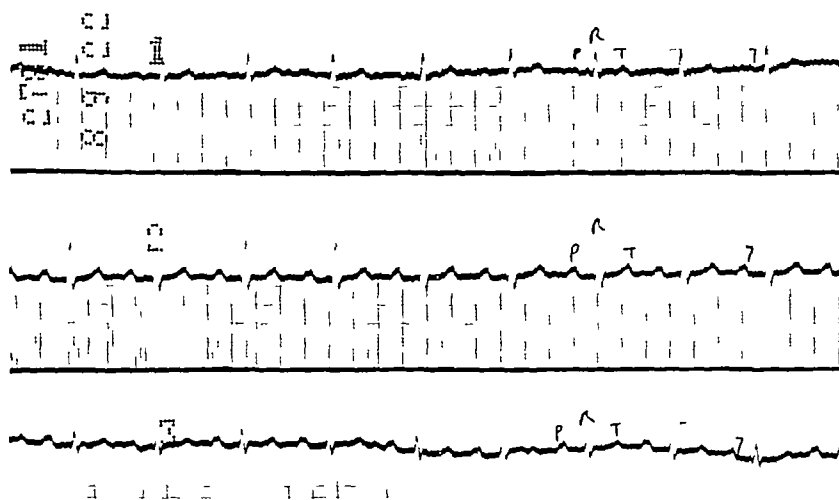
Electrocardiogram of B F M S taken July 11 1923 showing prolonged *P-R* interval left ventricular preponderance negative *T* wave in lead I widening of the *QRS* complexes and an auricular extrasystole in lead 2

FIG 7



Orthodiagram of F O P L taken October 18 1921

FIG 8



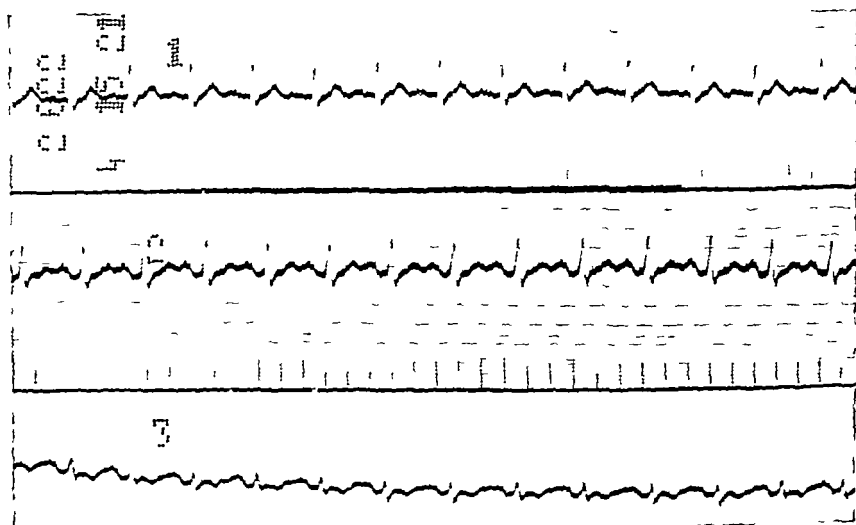
Electrocardiogram of F O P L taken August 9 1922 showing prolonged P-R interval and right ventricular preponderance

FIG 9



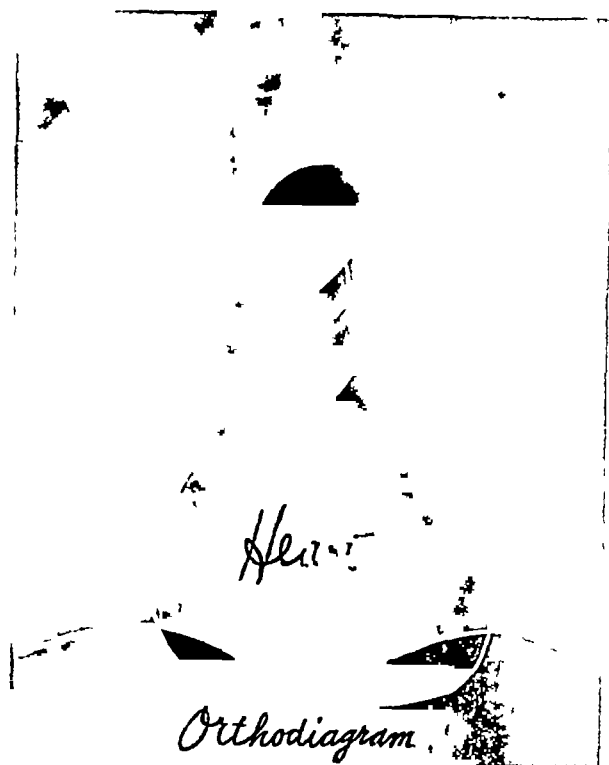
Orthodiagram of T H F F taken April 15 1921

FIG 10



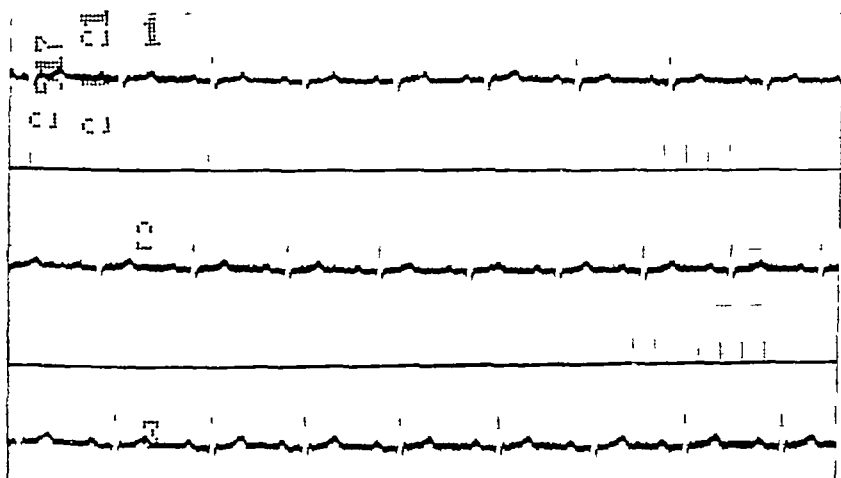
Electrocardiogram of F H F F taken April 15 1921 showing prolonged P-R interval

FIG 11



Orthodiagram of F S L O taken February 1 1921

FIG 12



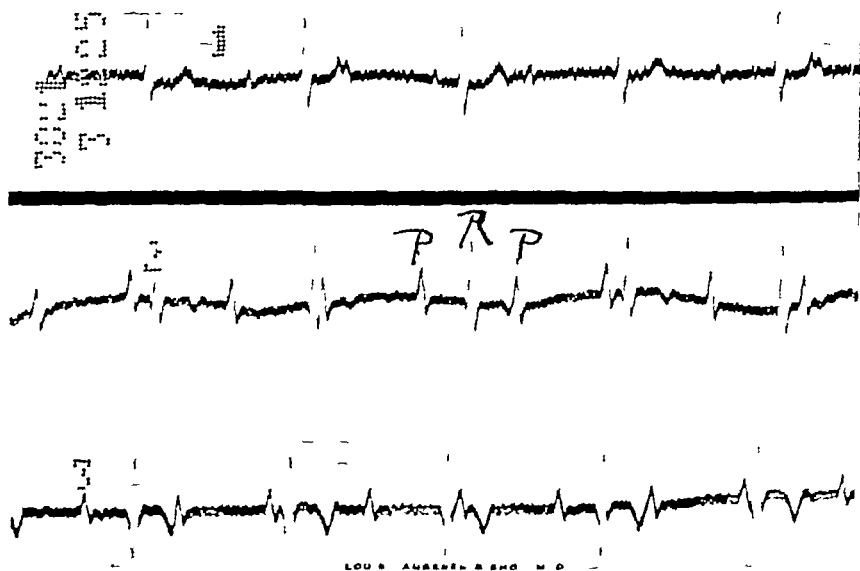
Electrocardiogram of F S L O taken February 1 1921 showing prolonged P-R interval

FIG 13



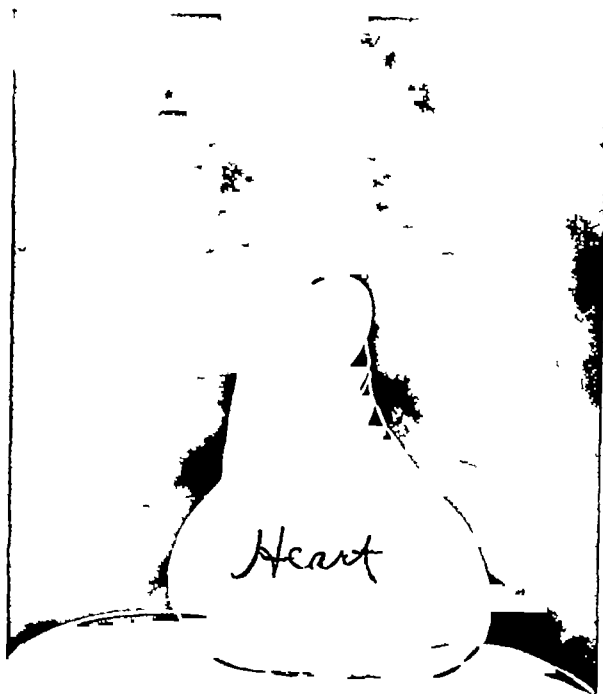
Orthodiagram of B P F L taken March 12 1925

FIG 14



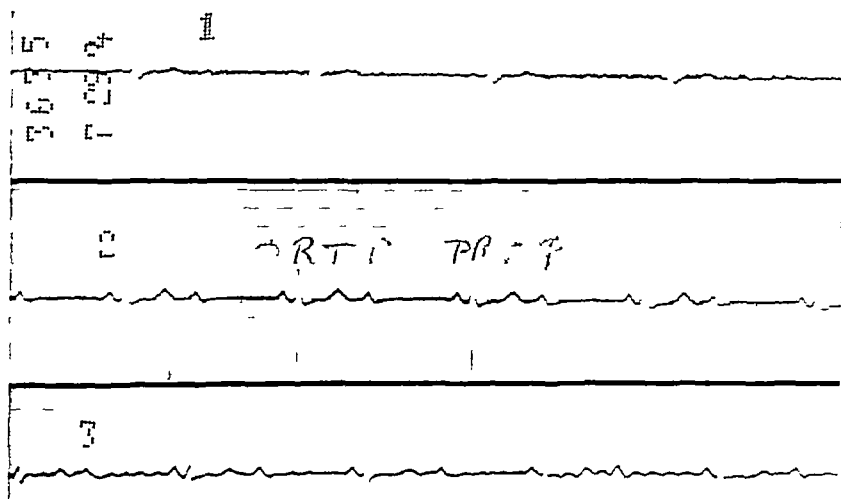
Electrocardiogram of B P F I taken March 12 1925 showing heart-block

FIG 15



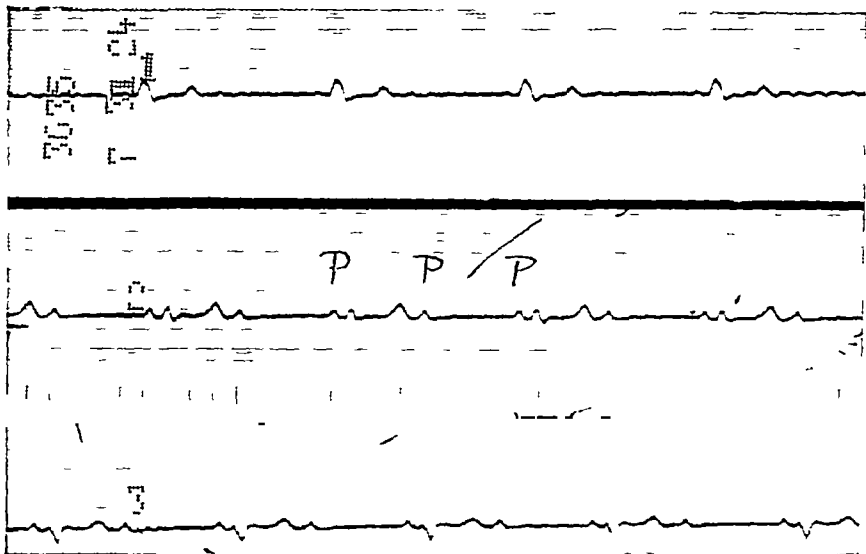
Orthodiagram of B H B S taken July 29 1924

FIG 16



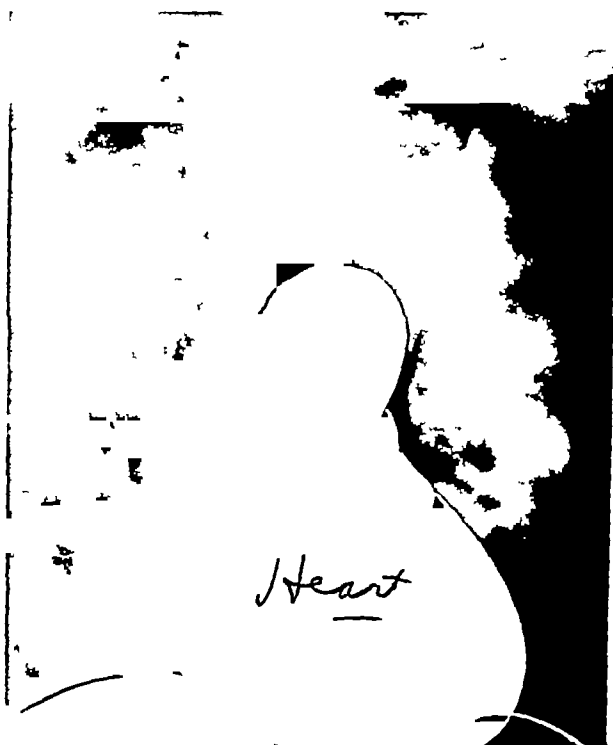
Electrocardiogram of B H B S taken July 29 1924 showing heart-block

FIG 17



Electrocardiogram of B H B S taken on July 31 1924 showing arborization block as well as heart-block

FIG 18



Orthodiagram of L. P. M. H. taken May 19 1919

vulsions. Treatment was given as indicated, and following a period of anuria of two days' duration a profuse diuresis followed after a phlebotomy

On account of emotional disturbances, particularly at night, small doses of morphine and hyoscine were needed to give this patient the rest and comfort due him

On account of his serious condition, of course, no anti syphilitic remedies were administered

The relative heart block situation here might well enough have been due to his old luetic infection.

Mr F O P L, a police patrolman, came to us in October, 1921, and is still under observation His trouble is very interesting because of the element of diagnosis He had suffered for many months from attacks of dizziness and syncope which were finally interpreted as due to heart block, though it must be confessed that some points in the history might have been interpreted in favor of petit mal However, long observation has inclined us more and more to the former opinion

In 1921, when first seen, he was forty three years of age, married, and complained chiefly of the above mentioned attacks He always acknowledged some discomfort directed to the heart attacks He was taught to use nitro glycerin promptly on the onset of an attack and was put on small doses of chloral, five grains three times a day On this treatment he got along pretty well for some years About two years ago he was retired and it has not been possible to follow him so closely

The orthodiagram shows a heart with a straight left border suggestive of mitral stenosis which was confirmed by the presence of a short pre-systolic crescendo murmur The blood pressure was normal—90 diastolic, 120 systolic. Electrocardiogram shows a left preponderance, proving that the mitral valve was not markedly obstructed, and delayed conduction between the auricles and ventricles This naturally raised the question of the relation between the syncopal attacks and the heart-block with due consideration to the valvular defect

It might be profitable sometime to re study all our valvular records to find out how many of those who suffered from syncopal attacks had also heart block.

Mr F H F F came to us in 1921 complaining of high blood pressure He was under observation for a year or more, during which time his blood pressure varied from 160 to 200 systolic. His general appearance was that of a well marked arteriosclerosis

The urine showed albumin and casts, and the conclusion was reached that he represented a well-compensated chronic kidney lesion

The heart showed a moderate degree of hypertrophy The electrocardiogram showed prolonged *P R* conduction time Possibly on account of this there were attacks of mental confusion, though it must be confessed that he had enough else to account for it

Shortly after he passed from our care he underwent a successful operation for appendicitis and is still carrying on an occupation involving much travel and intensive mental effort

Before coming to us he had been at Battle Creek and was thoroughly trained in the dietetic and hygienic measures appropriate to his condition

In our judgment the blood pressure was compensatory and our advice was to leave it alone.

He is a good example of an intelligent man with marked impairment carrying on by observance of a rational mode of life in spite of adverse circumstances

Mr F S L O, sixty years old, came to us in 1921 He had no symptoms but his oculist had detected choroiditis in the right eye He had always considered himself well His father died at sixty seven of apoplexy, but his mother was living and well at eighty two

His blood pressure was diastolic 70 and systolic 120 In the orthodiagram the shape of the heart rather suggests a slight congenital anomaly which is confirmed by the electrocardiogram. This anomaly is apparently of no importance to him, and the increased interval is probably connected with his condition rather than an acquired characteristic.

The curious similarity between the three leads led us to suspect a mistake in observation so that the electrocardiogram was repeated two days later On the third observation the left ventricle was apparently more active, for which reason the relative right preponderance was less marked

This history came up in routine review of our files and is reported because of its interest in showing a slight anomaly that has given no trouble

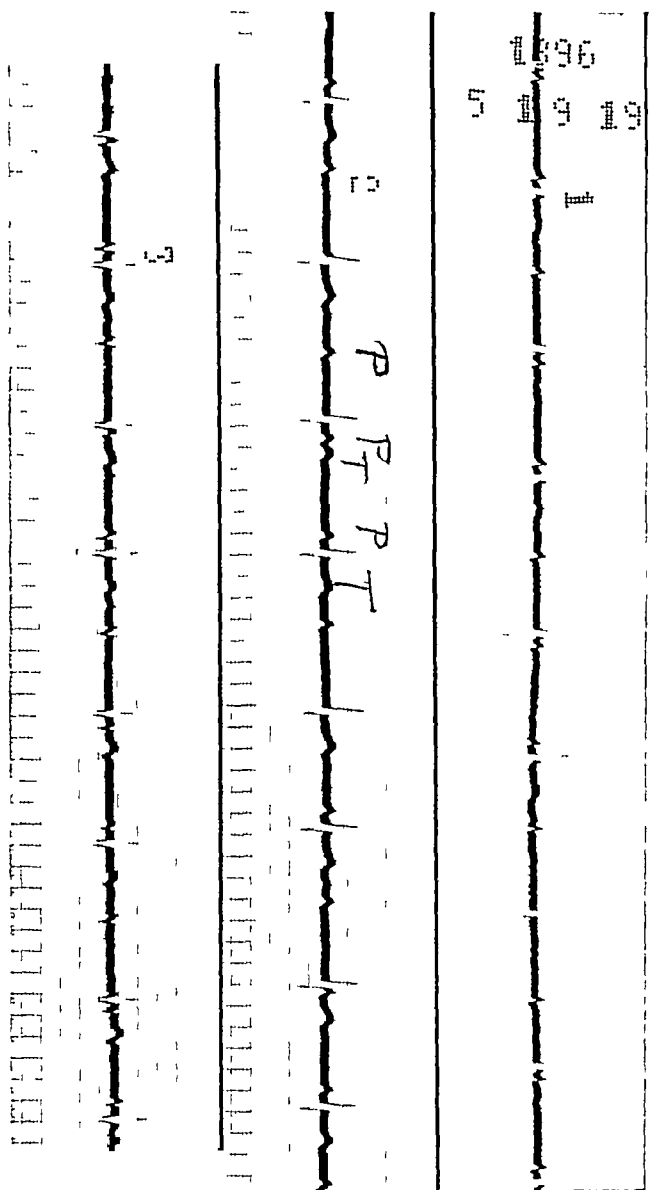
Mr B P F L, eighty two years old, was referred to me by Dr Max Einhorn His father died of intestinal cancer at the age of seventy four, his mother of liver trouble at the age of seventy six. He had never married He had not suffered from any acute illnesses but had had frequent periods of nervous exhaustion He had had colitis practically all his life and for thirty years had been under the care of the gentleman who sent him to me

For a long period he had noticed discomfort in the front of his chest when he walked rapidly or ate a heavy meal Of late this had become very trouble some One week before he came to us he awakened in the night with an excruciating pain in his chest with shortness of breath

The outline of his heart as shown by the orthodiagram is not different from that of almost any person of his age On physical examination evidence of sclerosis of the aortic valve, consisting of a to and fro murmur, was discovered The heart-sounds were very feeble and its action very slow and was counted by my assistant as 42 As estimated on the electrocardiogram it is 40 It is interesting to know why my assistant made this mistake The reason is that in counting a number of events occupying an appreciable amount of time, such as the heart beat, if you start the count at the beginning of a beat, you should stop counting at the end of the last beat of the period, and not at the beginning of the last beat. In other words, to make a three paneled fence it takes four posts In average clinical work, of course, when the heart is beating fast, this is of no importance, but in heart-block, where the normal ventricular rate is so slow, this should be taken into consideration It is good practice in counting pulses with a stop watch not to start the watch on a beat, but start the counting with the next beat.

The two electrocardiograms show that these pictures were taken two days apart. The first one shows nervousness and agitation In the second one he was more accustomed to the procedure, the base line is much steadier The tracing shows complete heart block The auricle is beating at the rate of 60

Fig 10



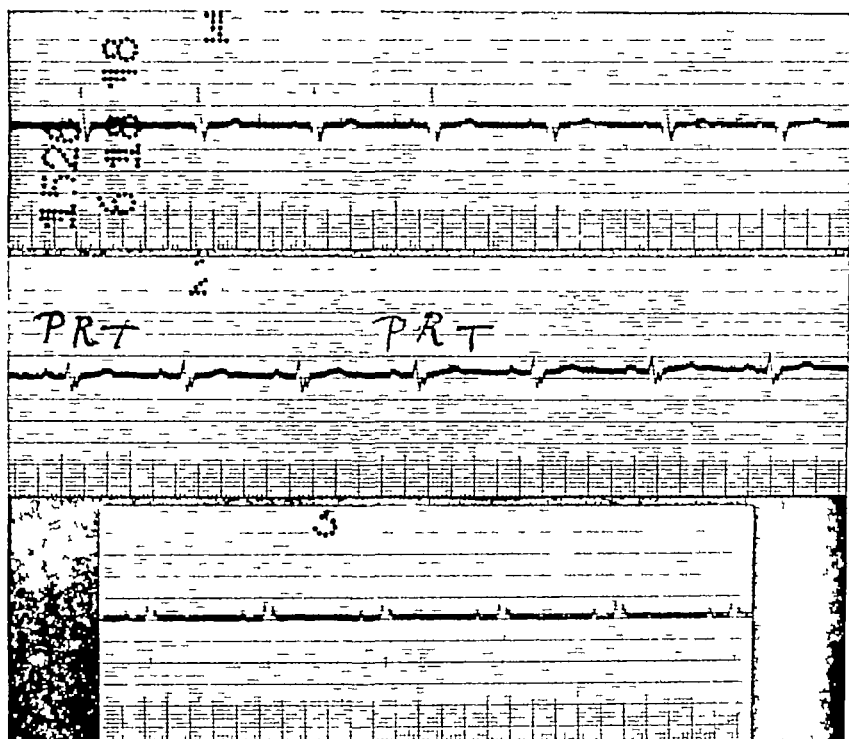
Electrocardiogram of L P VI II taken May 10 1919 showing heart block.

FIG 22



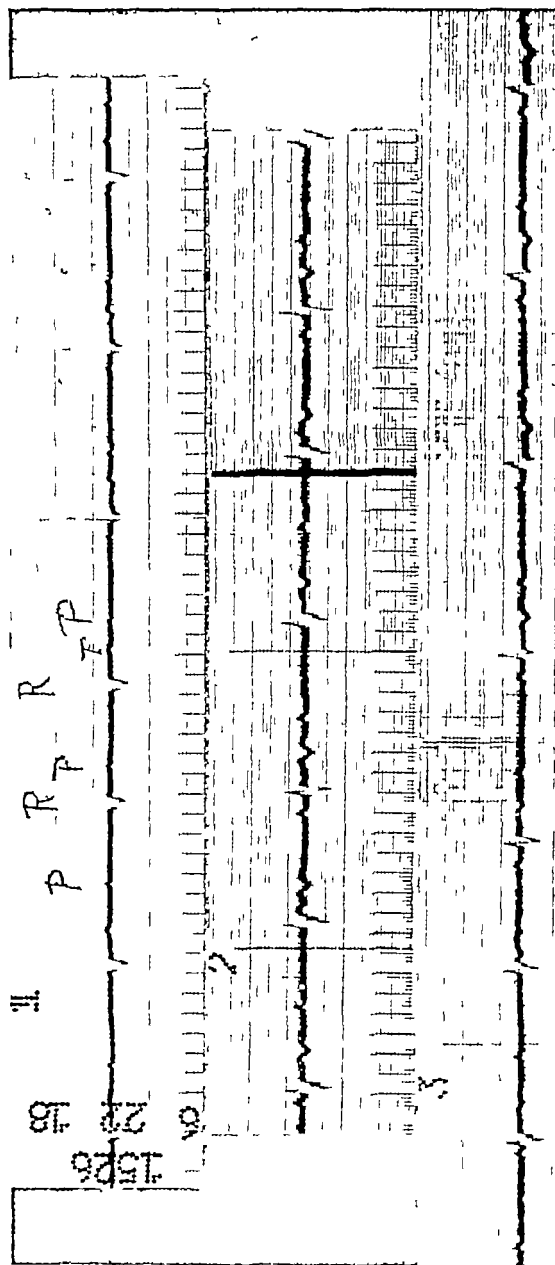
Orthodiagram of L. S. F. H. taken June 18, 1918

FIG 23



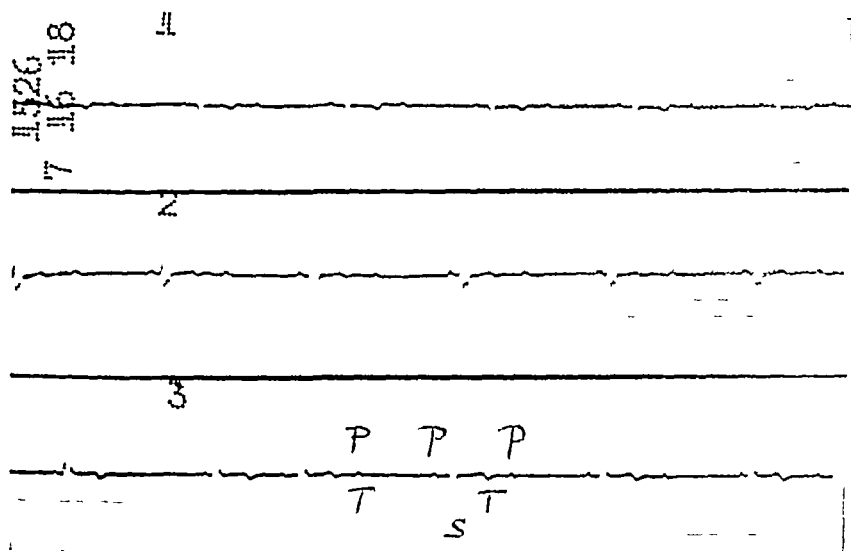
Electrocardiogram of L S F H taken June 18 1918 showing left ventricular preponderance and a normal rhythm No heart-block present

FIG 24



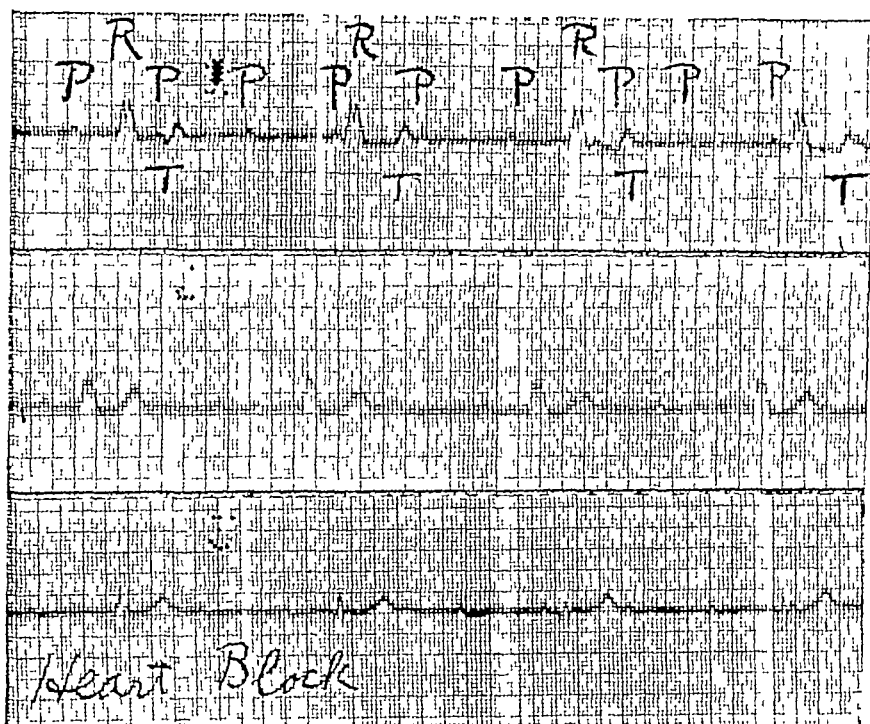
Electrocardiogram of L S F H taken June 20 1918 showing heart-block

Fig 2,



Electrocardiogram of L S F H taken July 16 1918 showing heart block as in the previous picture.

Fig 26



Electrocardiogram of L L H L taken May 10 1918 showing heart-block as well as bundle-branch block

Mr L L H L, a gentleman sixty years old, consulted me in 1917 complaining of nervousness and attacks of syncope and dyspnoea. He stated that four and a half years previously a doctor discovered that he had heart block, with a pulse of 36. No details of treatment were given by the patient.

On physical examination his condition was found to be relatively negative, except for a blood pressure of 100/60. An electrocardiogram taken in 1918 showed a complete heart block, with an auricular rate of 60 and a ventricular rate of 30. There was widening of the QRS complexes in all leads, with notching, which, of course, suggested a bundle branch lesion.

to the minute and the ventricle at the rate of 40 There is complete dissociation, but both chambers are regular

He complained of attacks of dizziness but had no true syncopal attacks such as are found in Stokes Adams syndrome

It might be remarked that a man of eighty two telling of mucous colitis lasting all his life illustrates emphatically the chronicity of this condition, and the association with nervous diseases is also quite characteristic

Mr B H B S, a physician, sixty four years old, came to us in July, 1924, complaining of dizziness and stating that he had a very slow pulse His general condition was pretty good He had had a severe attack of rheumatism eighteen years previously and another one two years later He had shortness of breath on exertion, and on one occasion, after climbing the elevated stairs, he collapsed completely

The first picture shows a 2-1 heart block The next electrocardiogram, taken a few days later, shows evidence of an arborization block as well as a heart-block. This is evinced by the wide and low *QRS* complexes

Mr L P M H., sixty nine years old, came to us in 1919 suffering from shortness of breath and discomfort in his chest His father died of an accident when young, but his mother lived to be eighty three He had one daughter and two grandchildren His wife was living and well He had been in good health until three years ago, when he commenced to complain of pain in his chest.

He showed on examination of the heart a double murmur over the aortic area Blood pressure was 100 diastolic, 200 systolic. The heart showed considerable enlargement and the outline is characteristic of chronic valvular disease The electrocardiogram shows complete heart block The absence of a left ventricular predominance in the presence of such high blood pressure indicates an old mitral lesion

In 1919 Master L P B H. was referred to me by Dr Frank E Miller He was six years of age and his heart trouble was first noticed when he was two years old, at which time the late Dr L Emmet Hold found a murmur

The electrocardiogram shows a partial heart-block with a 2-1 rhythm Auricular rate, 110, ventricular rate, 50

Unfortunately this little patient did not return for subsequent observations Heart block in one so young is quite unusual

I heard later that he was observed for some time by the Rockefeller Institute.

Mr L S F H., a gentleman seventy three years old, consulted me in June, 1918, on account of pain and discomfort in the cardiac region, which came on in attacks, particularly when he was walking along the street.

The physical examination was relatively unimportant, his blood pressure was 130/80 On June 18th, the electrocardiogram showed a left ventricular preponderance and a notching of the *QRS* complexes in the second lead. On June 20th another picture was taken which showed a complete heart block, with a ventricular rate of 40 and an auricular rate of 70 It is to be noted also on his picture that the ventricular rhythm is not perfectly regular, the irregularity being due apparently to occasional extrasystoles, possibly of a nodal variety On July 16, 1918, another electrocardiogram was taken which showed essentially the same condition as in the second one

The history of Mr L L H. L will be found under Fig 26

A DISCUSSION OF THE PHYSICAL AND THE PSYCHIC BASIS FOR A NEUROPATHIC CONSTITUTION *

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Defectives, New York City

II IS THERE A PSYCHIC MAKE-UP FOR THE NEUROPSYCHOPATHIC CONSTITUTION?

FROM the discussion and the unsatisfactory search for a plastic basis of psychologic types of human beings one turns with more hope to the possible solution of our problem. What is the essential make-up of the neuropsychopathic constitution and can we postulate subdivisions or types for the morbid and normal characters of human beings? We will examine some of Jung's work along these lines, together with the work of Jordan, James, Ostwald and others. Jung bases his type classes of human beings upon inherent "general attitudes" and "function" types. Among the first are the introvert and the extrovert. The attitude of the introvert is an abstract one, and an effort to withdraw the libido from the object. With the extrovert the subjective attitude is constantly related to the object. The result of this rather mechanical classification is that at first sight the types are in glaring contrast to each other and become so extremely striking that the average layman may recognize them.

There is a tendency to look upon the introvert type as individual eccentricity, but the expert knows it to be a type which pervades all strata of society and is found among both sexes. An individual is not like this from choice and the distinction between the introvert and the extrovert is perceptible even in children of the same family. The fact that children show type at a very early age proves that it is not a matter of adaptation. It is, in fact, inborn. Children may be forced to assume the opposite attitude but it is a question whether this is not a mistake. Jung takes up the extroverted type in detail, beginning with the general attitude of consciousness. His life is

* Section I appeared in the March, 1927, issue of the INTERNATIONAL CLINICS

wholly an objective one. He finds no factor in his inner life to interpose between the self and outside nature. His interest and attention are fixed absolutely on the external, which has for him an inexhaustible charm. He regulates his morals by those around him and at first sight he seems like a man who has been completely adjusted and adapted to his environment. One may not, however, be inclined to look on him as normal any more than the introvert. Both are normal for that matter.

The extrovert is able to fit into such conditions as he finds but has a notable weakness in that he does not regard his own body as part of the objective world. He neglects this with his mind and at the same time may also become lost in the objective world, which is seen when he attempts too much. When a certain point in his career is reached he develops an hysterical or psychogenic neurosis. Hysteria is by far the most frequent neurosis of the extroverted type. The singer may develop nervous aphonia under the strain of his career. The extrovert is suggestible and pliable to the influence of another. Fascinated by some adventure, he may under the strain of a conflict develop spasms of the œsophagus. He is inclined to overvalue objects.

One of the attitudes of the unconscious toward the conscious is a compensatory one. The extrovert is, as it were, sunk into the object, assimilated by the latter. There is, in fact, a suppression of the subjective. Hence the unconscious is the exact opposite, egocentric and compensating. The unconscious of the extrovert in a word shows introversion. The libido is fixed on the subjective. The unconscious always protests the action of the conscious when it becomes lost in the object. The unconscious is in this case infantile.

There is naturally a conflict between the conscious and unconscious which results from a block due to the unconscious tendencies. These calamities are, of course, not the rule, for usually there is an equilibrium established in the extroverted mind. The serious complications represent the pathology of extroversion. When there is equilibrium the higher, superior or more differentiated functions remain extroverted, while the lower or unconscious elements are introverted. Thus the same man may present the two types side by side. His superior, conscious thought is extroverted and his inferior, unconscious thought as compensation is introverted.

Extroverted thinking is not always concrete as some have taught, but may also be idealistic. There is of course a type of extroverted thinking and it is in the long run oriented objectively. Formulas are evolved which decide what is good or bad, beautiful or ugly. This thinking type tolerates no exceptions. In morality it cannot compromise and everything to it is either black or white. This type of person has no real love of mankind but a conviction of justice and truth. He will work for the unfortunate of all kinds but squares everything to his formula.

William James makes two types known as "tender-minded" and "tough-minded." These in a way correspond to the theoretic and practical, the rationalist and empiricist, the introverted and extroverted, and the active and reflective. Ostwald in his biographic analyses makes two well-marked types which he terms the "classical" and "romantic," which dualism is applied only to certain great scientific discoverers. The classical man is pedantic and formal, cannot teach what he knows and unconsciously wishes to please only himself. He matures late, and makes his reputation late in life. The romanticist can put himself in the pupil's place and know just what he needs, he matures early and founds a school which hands down his teaching. The romantic agrees well with Bleuler's syntonie man, who naturally has a liking and sympathy for all men and hence makes an admirable teacher and draws enthusiastic disciples.

Jordan has types termed by him "more impassioned" and "less impassioned," which Jung would probably find to be equal to introvert and extrovert. The more impassioned is less active—that is, more reflective. The "more impassioned" subject is the "less emotional." It is therefore necessary to know what he means by impassioned. It implies strong passions under stress, as extreme jealousy and cruelty in stepmothers. Deep attachment to her husband may make a woman in such a position exacting and jealous of anything which tends to monopolize him. The other type of woman is of an extroverted type which is always taken up with petty details, and expends all her strength in her household duties. Love means nothing but preference. She has poor self-knowledge, is hurt when told she is always hard to please, etc.—in general, has but little insight into her own character, which may be said of all extroverts—they know little of themselves and do not realize that others easily see

through them. Thus they will constantly criticize others and will not realize that others are always picking them to pieces.

According to Jung an extroverted man may be a thinker, although he thinks in a particular way. From some of the others we get the impression that an extroverted man does not think, and is unable to reflect, although this is of course absurd.

Jung makes everything more and more complicated the more deeply he gets into his subject and, as stated elsewhere, he has evolved a type of extroverted man which corresponds rather to what we are accustomed to associate with introversion. Apparently as a result of his close touch with the external world with which he identifies himself, the extroverted thinker develops rigid formulas of life. Some of the other writers intimate that the extroverted man takes life as he finds it and never wishes to change it or think of changing it. This may be so in a way, that is, he does not try to think up new philosophies of life. But as a result of his years of observation he becomes so convinced of certain truths that he sees no possibility of two sides to a question. Such a man is very likely to be a believer in religion as a practical force, in prohibition, etc. In the same manner he believes just as firmly in other things, the value of advertising, a strong policy toward his employees, the harmfulness of trade unionism, etc. He believes that the end justifies the means.

His shortcomings are seen in the rigid rules he applies in raising his family and in his lack of subjectivity, which often makes him neglect his health. In trying to apply his rigid rules outside of business he often comes to grief. He has a lack of finesse. His sense of feeling is inferior. The formula or ideal which he has built up empirically from his observations of men may become a source of danger in the end. He is the familiar type of the religious man who practises sharp tricks in business and is held up to scorn as a hypocrite. Subconsciously he must be more or less of a skeptic because the fanatical attitude is only over-compensated skepticism. The more open the fanaticism, the greater the secret doubt of his formula.

Extroverted thinking is practical and obtains results. It is synthetic in type and constructive. Analysis when practised is never destructive. The type is almost exclusively a masculine one.

We may now consider the extroverted thinking type in contrast

to the extroverted feeling type. The latter is feminine just as the former is masculine. This feeling type is quite distinct from another, the extroverted sensation type. The latter seems to agree somewhat with extroversion as described by others. The subject leads a purely objective life and his whole existence is a train of actual experiences with concrete objects. But despite this empirical quality Jung insists that this type does not learn by experience. The reason for this is that he always follows the new and forgets the old. The type is usually male, and has poor insight into its relationship with things. Again, his interest in things is restricted by the pleasure they give him. Apparently he is much like Kretschmer's cycloid and Bleuler's syntonic. Generally he lives on a low plane, thinks mostly of a good dinner, etc. If interested in art objects he may become an æsthete in that direction. He distrusts whatever comes to his consciousness from within as morbid and unnatural. If he has no means he becomes a hanger-on to others and is unscrupulous. This type may develop compulsions and phobias.

Still another type is the extroverted intuitive. This and the preceding are styled by Jung the extroverted irrational types, while thinking and feeling types are called the rational. This intuitive type is very vaguely outlined. It is feminine rather than masculine but evidently is common among men, for "merchants, speculators, contractors and politicians are mostly of this type." All of these men live on future possibilities. They look on objects only as they give promise of developing into something big. They become enthusiastic in proportion to the promise but when the object does not make good they shift immediately to another more promising.

There are introverted thinking types to correspond with the extroverted. Darwin represents the extroverted thinking type. His outlook was on objects of nature and he reached the synthetic formula of evolution. The corresponding introverted thinking type is furnished by Kant. Cuvier was extroverted, Nietzsche was introverted. Kant, like all of the metaphysicians, got his basis for thinking from within. Kretschmer in like manner makes Darwin a cycloid and Kant a schizoid. The introvert shows an indifference, a negative attitude toward the object, and it is only a step to the denial of its existence. This detachment from the object makes the impression of coldness and inconsiderateness. He does not care for the approval of others.

nor for their influence. Being wrapped up in his interior life he is unaware of what goes on about him and is imposed on by all. The neighbors do not understand him, and think him a learned fool. He is scrupulous, pedantic, over-conscientious about the truth, and slow in performing his work. He is awkward and naive in ordinary relations and seems like a grown-up child. Through his public form he may make many enemies who find when they first meet him that he is nothing like the view that they had formed of him from his controversies and teachings. He usually has a coterie of friends who look out for his interests. Women may not appeal to him although he is very pliable in their hands. The introverted feeling type, like the extroverted, is found chiefly in women. Here belong the silent shut-in types of women. A subvariety is seen in the scheming, ruthless type who is unscrupulous and mischievous. The introverted sensation type is not very clearly visualized by Jung. He is a mystery to others and himself as well. Apparently he lives in a world of mythology, of symbolism, personifying everything as something either good or bad. Not that he is conscious of this attitude, but it can be seen by others. The introverted intuitive type is still more elusive.

In order to get a better insight in Jung's views we must consider that the division into extroverts and introverts originated with him as a result of the exigencies of his practice among nervous subjects. It represents, in other words, a discovery, and is not an invention. In theory a man should know which type he himself belongs to but in practice there is much lack of insight. This confusion of type is due to the fact that in every nature the type provokes a compensatory reaction. The result is that the extrovert has a compensatory introversion and *vice versa*. This makes human nature so complex that many refuse to believe in types at all and follow the popular belief that every man is a law unto himself. Every man is both extroverted and introverted and we can pick out only the predominant traits.

The best evidence of this double nature is seen in its recognition under some form in all ages. Goethe has likened this to the rhythm of systole and diastole. A man has an experience with the external world and then turns this over in his mind. Two mechanisms are involved, one for seizing and apprehending an object and another for elaborating the object in the mind.

Jung has contrasted the Church Fathers, Tertullian and Origen, as types of introverts and extroverts. Tertullian was a precisian, a fanatic, who followed every idea to its logical conclusion no matter where it led, totally lacking in humanity and a rigid moralist, while Origen was a theologian and scholar, having many students, and was beloved by all of them, he was interested chiefly in upholding the claims of the Church to divinity. Tertullian was a sort of Bryan who believed in sacrificing the intellect with the senses. Origen placed himself out of the way of temptation by castration.

The Tertullian-Origen antithesis has been present in the Christian Church in some form ever since, and while Jung did not, of course, know this, it is very active at present. The Fundamentalists are the introverted men and the Modernists the extroverted.

Jung also contrasts Plato and Aristotle as types of introverts and extroverts, and follows down the same antithesis through the Middle Ages, where it was expressed by the endless struggles between Nominalists and Realists. The former held that all abstract and collective nouns were merely words or symbols while the latter held that beauty, goodness, man, etc., were realities. The word *realist* in this sense is confusing for it really means *idealist*, while the nominalist is the skeptic and materialist. The antithesis, therefore, had better not be carried out, for realist agrees better with materialist and with the idea of extroversion than with the idealist. This discussion, "name or thing," was always cropping out in the Middle Ages and especially in theology, for while some, for example, held that the wafer and wine of communion were only symbols, others insisted that the sacrament actually transformed them into the body and blood of the Lord.

The study of types Jung holds to begin formally with Schiller. In his day psychology, as we understand the term, did not exist. The poet was of the introverted type himself just as Goethe was extroverted (Kretschmer calls Schiller a typical schizoid and Goethe a cycloid). In his outline of an idealistic type he is describing himself. He is better oriented in ideas than in things. He regards his idealism and the resulting conflict with the material as a wound which modern man has sustained as a result of culture. The instinctive life of the primitives was perfectly harmonious, but as soon as subjectivity asserts itself all is chaos. Man gains by culture in some

ways but loses in others. By culture Schiller means only modern culture. That of ancient Greece evidently did not lead to the same conflict for the old Greek excelled the modern man in all-around manhood. In other words, what the race has gained by culture the individual has lost. Schiller over-rated the Greeks from ignorance, for they suppressed the proletariat and slaves, and Christianity restored them by its democracy. However, Schiller was right in general.

According to Schiller, one-sidedness—as he terms excess of one attitude over the other—does harm to the individual but is necessary for the development of the race. The only means for developing man's manifold capacities is to set them against one another. In this manner the individual becomes lost in a force or in a collective body of men. There is a great gulf between what a man is and what he stands for.

The correspondence between Schiller and Goethe reveals the opposite temperaments of the two men and Goethe actually admits that Schiller caused him to recede from his attitude of extreme objectivity to one more subjective.

The basic idea in Schiller's essay is education by harmonious development of all sides of man. He has noted that in a world of beauty and art there is no political equality, while fine manners may go hand in hand with the worst immorality. He therefore suggests something of the compensation of one attitude through subconscious development of the other. Goethe led primarily the external and objective life but when he chose could externalize all that is without and shape it from his own mind. Conceptions being once formed in the mind the external world will have to adapt itself to them. This seems to be a compensatory action of introversion. In other words, he is quite as dogmatic as the introvert who forms his notions not from what he sees but from his feelings of intuition.

Much of what Jung has to say of Schiller is of no value for the isolation of types. In one connection, however, the poet draws a distinction between the idealist and the realist, which he states is deep-rooted and the cause of much friction. The gulf between them cannot be bridged and as a result no philosophy of life can appeal to all men alike. Poets of opposed types produce different types of poetry, one realistic, which describes nature as it seems, while the

idealistic poet takes a reflective and abstract attitude and describes the emotions which objects in the external world provoke in him.

Nietzsche also has two types, characterized respectively by "dreaming" and "frenzy" He calls them the Apollonian and Dionysian The dreaming type creates a world of beautiful illusions The other type stands for force, for the instinctive, and involves loss of individuality This frenzy appears to be identical with the libido Man from the Dionysian standpoint personifies Nature

The book of Jordan is the more singular because he is a surgeon and his other writings are all on surgical subjects The full title of his work is "Character as Seen in Body and Parentage" He does not divide man into two types alone, but two extreme types with mixtures of the two They correspond to extreme action with slight reflection and the converse of great reflection with feeble action

The less the activity, according to Jordan, the greater the element of "feeling," so that he calls the active the "less impassioned" and the reflective the "more impassioned" One may think this unfortunate, for active men may be of intensely passionate natures, in the ordinary sense of the word

However, it is not difficult to see in these types the extrovert and the introvert. Jung himself formerly associated the introvert with thinking and the extrovert with feeling This is superficial and impressionistic The extrovert is showy and the introvert less conspicuous, but this may be illusory Jordan renders a service by pointing out that the introvert is the affective type, while in the extrovert the intellect dominates the emotional sphere Hence from this angle the former may be the "more impassioned" man It is peculiar of the extrovert that he has an unconscious aim in life He cannot see himself, but those who know him see it This ought to be the consequence of his lack of self-analysis A balance between the two types of Jordan seems akin to the intuitive type of others

Unlike most creators of type Jordan works his out upon women This has already been alluded to He says of the extroverted man that he is uncertain in temper, well satisfied with himself and critical of every one else. His judgment is defective and leads him into trouble, but he never loses faith in himself He has formulas to decide things off-hand He matures early and has excellent executive ability, is unhappy in forced idleness, does not originate things but

is quick to use the ideas of others. He has a strong sense of publicity and loves the limelight. He is given to "bluffing." He wishes to have a voice in everything. He is usually moral and acts from high principles. He has many illusions about himself and, in fact, seems not to know very much about himself. He thinks the public has opinions about him which are very different from the true state of affairs. Much that Jordan says of him agrees better with Kretschmer's schizoid than with the cycloid. As Jung states, this description fits a type of man known to every one but is not typical of an extrovert. The introvert is summed up by Jordan in a few words. He is not restless and is inclined rather to undervalue himself than to go to the other extreme. He is not critical of others but inclined to see the good in everything and bestows praise generously. If he becomes prominent it will be because his friends push him forward. Since a man must belong to one or the other type himself he is a biased observer and can hardly give both types with the same degree of lucidity.

Jung also takes the characters of Prometheus and Epimetheus as found in a poem by Spitteler. These characters have always been supposed to represent the man who acts before he thinks, and the man who thinks first and acts afterwards. In some respects Prometheus is an introvert and Epimetheus an extrovert. In the poem Prometheus surrenders himself to the soul and loses touch with reality. He retains his soul in spite of all, while his brother parts with his soul. Goethe, however, has a conception of Prometheus which is extroverted rather than introverted.

In the author's summary at the end of the book Jung speaks of having drawn "from four to eight types." He does not claim that he has exhausted the number. He means that another grouping might replace his own. Just what he means by four to eight types is not quite clear but probably the four types are the rational types—the extroverted thinking and feeling and the introverted thinking and feeling. The four extra types are the so-called "irrational" ones.

To return to various philosophical types, beginning with James' "tough-minded" and "tender-minded," we find the attempt by James to identify his types with those of others. Thus the "tender-minded" type is the "intellectual" type. The "idealist" type, the "opti-

mist" type, the "religious," "free will," "monistic" and "dogmatic."

The "tough-minded" man of James is on the contrary the "empiricistic" type which judges of life as it finds it, the "sensationalist" type which knows of no knowledge beyond the evidence of the senses, the "materialistic" type, the "pessimistic," "religious," the "fatalistic," the "pluralistic" (as opposed to monism) and the "skeptical"

James himself, despite his outlook on life, seems to belong to the tough-minded, or at least he tries to be fair to that side. But his choice of the words "tough" and "tender" would seem to indicate a preference for toughness of mental fibre, the word "tender" connoting weakness. It illustrates what Jung says concerning the fallibility of all types because the man who establishes them will be biased in favor of one or the other.

Naturally all of this pairing off ignores compensatory efforts (For instance, an introverted man is a poorly adjusted man and if he cannot look at things more from the extrovert side he will find it difficult to earn his living, such a one owes much to the services of his intimate friends who do for him what he is unable to do for himself.)

When one takes up the couple "rational-empirical" one finds it vague. By reason, abstractions and principles are formed but this property must inhere in the other type. There must, therefore, be a difference in the principles evolved by the two types. For the empiricist these are deduced solely from the evidences of the senses, while in the other type the concept or principle is not deduced from sense evidence but preexists in the mind and is *a priori*. The distinction appears later in some of the other pairs.

James contrasts the intellectual with the sensational, which seems to be only the same distinction under different words. One reasons from sense-findings only, while the other represents pure metaphysics and is independent of sense-findings.

The next pair of types, idealist and materialist, seems in part only a variation of the two preceding. There is, however, an element hitherto not enumerated known as intuition which seems to combine the two qualities, and which cannot be claimed by either. The materialist or empiricist also possesses certain conclusions. In

general one may regard the divisions as too superficial, and not sufficiently exclusive. Materialists have lofty ideas and ideals which do not come to them from the senses. The divisions do not work out for individual characters.

When we come to optimism and pessimism this does not work out in daily life either. Many men show neither optimism nor pessimism in their philosophy of life. There are optimistic extroverts and pessimistic introverts. A materialist ought to be a pessimist, perhaps, but may not be one. An idealist is supposed to be an optimist but may not be one.

The next pair is religiousness and irreligiousness. This is largely a subject of terms and there is possibly a state of mind common to all people which corresponds to religion. One may seem without religion and yet pay homage to truth and facts. Half the world cannot be irreligious, but that is what it would mean.

The next antithesis is fatalism and free will. The empiricist and materialist cannot arrive at any such element as freedom of will, for part of his fundamental belief is that every effect has a material cause. The *a priori* thinker has a sense of power which he thinks transcends experience. His attitude of detachment from the external world helps him. He struggles against anything which identifies him with the object.

In regard to monism and pluralism the idealist naturally believes in the oneness of the universe. It does not appear that this antithesis is a very pregnant one. The extrovert simply seems non-committal on this point. There is simply a tendency to pluralism. The modern conception of the universe and the identity of matter and force seems monistic enough. Pantheism is a form of monism, although one which has always antagonized the Christian faith.

As one can already see, characters are extremely complex, and there is more or less defense and compensation everywhere. Thus one may show that the most masculine and virile types have a feminine strain in the subconscious which accounts for much that is puzzling. The two psychic sex anlagen must be inherited and if the feminine is completely suppressed it must exist in the subconscious. In judging the type of a man this element of sex suppression cannot be left out.

This is often seen in the great contrast between the public life

and the home life of a prominent man. Abroad he is aggressive and dominating and at home he is weak and compliant, ruled by wife and children. Conversely, the man who seems angelic outside the home may be a tyrant within it. No mere division into types can explain this splitting of the personality. Hence a man cannot be judged until he has been seen in several distinct reference frames.

Scattered through Jung's book are numerous truths about types which are not always emphasized under leading traits. Thus men who are self-taught must make use of introversion.

Gross calls the introvert a seclusive personality because the complexes of the introvert are detached and he connects them up with difficulty. It seems akin to the schizoid idea which Jung nowhere mentions. In the introvert complexes like sex, love of power, enjoyment, etc., are all sharply divorced. In this way great contrasts are produced, as in the case of one of Jung's friends who was equally sincere in the pursuit of transcendental idealism and in patronizing cheap brothels.

The introvert is destitute of the instinct for practical life and this is replaced by a deepening of consciousness and individuality. He is not destitute of feeling as some imagine but does repress his feelings. Thus repressed, they are still present, and this agrees with Jordan's view that the passionate man is not the one who expresses his feeling but he who holds them in.

The introvert enjoys developing an idea without reference to the external world of reality and in this way gets far beyond the limits of ordinary existence in a world of his own. The extrovert does not understand this habit and may believe that the introvert is interested in certain fantastic things when he is only amusing himself. An introvert, for example, may put himself in imagination in the place of any one—a cannibal, perhaps, as Kretschmer says of the schizoid, such an attitude is necessary in the world of art and literature. Extroversion is the means by which we reach material civilization, while introversion is necessary for what is called culture. The man of culture is often at swords' points with the merely civilized man. It is quite possible for an introvert to lead an extroverted life if the milieu is arranged in complete harmony with his own ideas. As Kretschmer says of the schizoid, within his own little circle of friends or sympathizers he unbends and becomes human but

freezes up as soon as he gets into the medium of everyday existence of the outside world. Here he is tense, in contradistinction to the extrovert or cycloid, who is relaxed in an ordinary environment.

To change the attitude of an extrovert from relaxed to tense it is only necessary to shut him up alone in a dark chamber. Under similar circumstances the introvert can busy himself with the inner life. The introvert might be termed a man who can stand his own company or be company for himself.

There is a way of explaining introversion as a universal property of man, a desire to escape from the world of nature because of its terrible character. This is worked out in Buckle's "History of Civilization" in connection with the Hindus, who have always been exposed to the worst aspects of nature, as earthquake, famine, plague, etc., etc. They tend to retreat within themselves and to develop a complicated inner life of abstractions. Jung mentions this but without regard to any particular race. Nature in general is too vast for mankind and seems about to smother and devour him. He feels small and insignificant and as a defense he looks inward and develops his sense of individuality, which he sublimates with an idolized beauty. But not all men are thus affected, or at least not for long. They manage to identify themselves somehow with the objects about them and even feel a sense of superiority to them. Jung quotes Worringer (whose views seem akin to those of Buckle as to the origin of the Oriental attitude, the latter quoting Buddha himself). Life and the world are so horrible that withdrawal into one's self is the only course open to a man. Buckle speaks of Greece as remarkably free from these hostile manifestations of nature so that the attitude was one much more extroverted and the Greek was in the closest touch with the external world, but by aid of an externalized idealization that often sacrificed many truths in reality.

In an effort to establish specific psychologic types various writers find they are foiled by the facts of variant human existence, that human nature, morbid or normal, may not be exactly or statically defined, or schematized into a formula. Interesting as the attempts are, the main fault is, first, that the formulations have to be too general, and secondly, they must rely in greater part upon objective data for scientific specificity, whereas much of such material in its more genetic origin is soon resolvable into a number of contending

forces, such as desires, states of mind, or unformed dynamic impulses. Only when we gain a more comprehensive analysis of the underlying dynamics of the unconscious urges and desires may the real intricacies of human nature be approximately understood. There are fairly good reasons to believe that the main current of human activity as expressed in the general category of extroversion is drawn largely from the intensive drive of the heterosexual impulse in selecting an external love object, while the introvert is essentially homosexual and egoistic and seeks the love object in a narcissism residing in the individual's own egoistic world. Neither one of these types is probably ever pure, hence the difficulty of making sharp and fast distinctions of types, except in the most general terms. How best to colligate these two forces, active and passive, conscious and unconscious, at one and the same time is the great problem of living to fully adaptive ends. To stabilize the extroversive and mobilize the unconscious introversive tendencies are the real issues of the extrovert. The contrary holds true for the introvert. All the modifications or subtypes of Jung and the others are but secondary elaborations of the modifying influences of these two great currents or trends of the libido acting and reacting upon each other.

It becomes increasingly obvious that there can be no definite outlines of a constant plastic or structural pattern for the neuropsychopathic make-up nor may we the more surely demonstrate distinct psychopathic types as Jung, Jordan and others have undertaken to give us. Where does the fault of this manner of approach lie, and how may we gain a better comprehension of the main characteristics of the psychopathic constitution and how it has originated? The term "psychopathic" is in daily use in neuropsychiatry and carries a definite although vague clinical connotation. One readily recognizes that the term embraces a series of patterns of behaviors or modes of response. So soon as these patterns are too specifically formulated, the conception loses vitality and becomes mechanical and seemingly no longer applies to human beings. We know that the constitution as such comes into being, like all other vital modes of response, as a peculiar, inherent pattern of behavior in the organism acting and being reacted upon by various environmental stimuli. The sources of the psychopathic traits, then, do not differ from those essentially not psychopathic. They rest neither within the performed

structure of the organism nor in the environment, although they probably more specifically arise from the former than the latter inasmuch as the inherited traits are the dominant ones in control of the morbid types of vital reaction. The psychopathic constitution, then, is like other less specialized life reactions, born of a varying intensity of this life process. It is a loose and visible conglomeration of maladaptive traits of behavior lying within the life process. They exist in and through the vital process just as do all other modes of response of the organism. They are subject to the same laws which underlie the behavior of all other more adaptive modes of response. To this point one may fairly sketch a mechanistic and logical development upon psychological lines of all behavior, both adaptive and morbid, and yet be without a comprehensive explanation of the real origin of the psychopathic constitution, but it is no more mysterious in this respect than the life process in general and, indeed, until we gain a more specific knowledge of the latter the former cannot be more definitely stated. If science has not failed, it is as yet not quite reassuring that its ultimate goal will be reached by its powers of analysis. If other methods, vitalistic or metaphysical in character, give us a more satisfying hypothesis for the formation of behavior, we may be obliged to accept them, but if so it places the whole matter outside scientific inquiry and investigation and we may not enter upon this discussion at this time.

From whatever angle the matter may be viewed, from the physical types, the endocrine, the biochemic or psychic, I believe a pure plastic type or types of humankind cannot be fashioned, although our growing anthropologic knowledge lends a clearer view of the complicated factors in such a delineation. When one has formed a fairly definite plastic type *per se* it does not properly colligate with the psychic attributes. Plastic types may be consonant with psychic ones or seemingly as frequently be dissonant with the latter. The establishment of psychic types according to any of the main contenders, such as Kretschmer, Kollarits, Vollmer, Goldthwaite, Bryant, etc., gives us more practical results in classification.

Categorically, we may conclude that

(1) While we have sufficient biologic data to know the integration of the behavior mechanisms of an organism we have no precise data

of the manner by which the development of a human being has come about. The biologists, psychologists, sociologists and ethnologists have not yet observed or recorded data in this whole field.

(2) There is no distinct and uncomplicated plastic type for neuropathics. The very imbalance of life seems to preclude such a pure specific phenomenon. This is what we might expect from all biologic studies.

(3) Neuropathy lends some aid in understanding types of human beings. A narrower designation of so-called "psychologic" types furnishes an even more attenuated comprehension and lacks an all-roundness of complete observation to make such designations of value in neuropathology.

(4) Chemic and endocrinic studies are of secondary value and undoubtedly in future must be corrected much better with physical and mental processes to aid us in understanding constitution for disease as well as for so-called "normal" controls.

(5) The admirable work of Kretschmer is an outstanding contribution to human types both in the dyscrasia for disease types and to a less extent for the so-called "normal" variants. His work is still too static and not adapted for clinical use as we have already endeavored to point out. With some modifications his work may be fairly well coordinated with that of Jordan, Vollmer, Kollarits and Jung.

III PREDISPOSITIONAL TYPES OF CHARACTER IN MENTAL DISEASES

We may now summarize briefly the more specific designations of constitutional subtypes in special mental diseases. As yet this field has been confined largely to the dementia præcox, the manic-depressive and the epileptic. Here one might expect more specific delineation of character types inasmuch as the subtypes have been drawn directly from the case material of these psychoses. Such expectations are fairly well met, in part at least. Unfortunately in many instances the early history of these psychotics is tinged with the known and pronounced characteristics of the florid state itself and that part of the retrospective history but little allied to the well-known symptoms of the disorder is given the ample delineation which the whole personality and plastic characteristics really require. In brief, this plan of procedure has its drawbacks and may confine

our attention in too narrow compass to physical and mental attributes. Some investigators devote their first inquiry to the genesis of the symptoms of attributive characters which they see persist in residual or interval periods after or between the more florid exhibitions of the classic psychotic picture. Such an inquiry is also half-heartedly entered upon because many are inclined strongly to the opinion that such a status of the individual when it is found to exist independent of the precedent to the frankly psychotic episode is really but another or fainter aspect of the later psychotic state, so that there is a constant attempt to confine the examination only to those trends in physical and mental attributes that are actually present. Happily a larger and more scientific inquiry into the whole range of a developing individuality now in process of use will overcome this defect. Nothing less than a broadly psychobiologic inquiry independent of the main symptoms will do away with this just criticism. Perhaps in spite of what we have just stated we may be permitted to single out the main and outstanding characteristics of the florid aspects of the psychoses under investigation and trace their mental integration, for instance to study the origin of the splitting of the personality and the shut-in tendency of the dementia præcox, the expansive characteristics of the manic phase of the manic-depressive, and the depressive characteristics of the retarded depressant. In doing so we may see some of the colligation of the data already discussed in regard to character types in general as well as that drawn from the actual clinical material of psychotics.

Of late years much has been done to trace the personality characteristics seen in the psychoses. For example, Maier has shown the morally degenerative character in the general paretic before his disorder as such broke out. A similar and more detailed exposition has been worked out by Hollès and Ferenczi. It has been shown that in such a well-known paradigm disease of organic type as that of paresis the essential florid aspects of its clinical picture follow or flow out of the innate psychic constitution and the destructive meta-syphilitic process would appear to set in operation or perhaps release the involutionary mechanisms of the earlier integrators of the personality. Kehrer and others have shown that the character enters into the organic-paralytic process as well as the benign psychoses and this has proven true not solely of the paranoid types with their



well-known egocentric trains of thought but they follow in many manic and depressive types, overshadowed as they may be by the main dominance of other thought trends common to the general disease likeness. While in general these underlying and innate characteristics are perhaps most easily detected in the simpler types of psychotic individuals, the same may with greater pains be traced even in most complex natures. These main personality ideas, wishes, emotions and inclinations group themselves closely about the genetic impulses and instincts. In even deeper analysis the hypochondria of the involution melancholiac shows distortion and dissociated forms of sexual desires. It is well known that the climacteric and castration may through their numerous sensations give rise to psychoses or color them.

The Manic-depressive Make-up —As we have heretofore pointed out, the anlage for the manic-depressant is shown in those physical and mental attributes that are not directly traceable in the manic-depressive picture as such. Perhaps if this fact is borne in mind the number of individuals who show a psychopathic constitution may be enlarged to encompass many more than 37 per cent, which Kraepelin places in his clinical experience. The disturbances in the emotional life not infrequently present in the youthful candidates for a later manic-depressive psychosis are much more frequent in the relatives than in the actual manic-depressive himself. These several basic components comprise moodiness and depression, states of excitement, irritability and alternating states described as cyclothymic.

The *depressive* state is so marked as to constitute one of constant gloom. Even the intellectual activity may be variable, from complete efficiency to specific and marked retardation, whenever the intellect is non-participating the gloomy outlook interferes with its efficiency. The subject is full of inhibitions or internal sense of obstruction and above all is easily fatigued. No real pleasure is derived from employment. Often such individuals are forced to go over the same task again and again. There is the greatest over-seriousness. Petty annoyances are exaggerated or favorable incidents are not set at their true value. To their companions they seem irritable, disagreeable, unfriendly, capricious and wrapped up in themselves. In not a few the subjects are able to conceal their true state from even their intimates but not from the careful examining physi-

cian Most frequently their essential defect is in the sexual sphere Its incomplete repression is shown in anxiety The anxiety is shown in efforts at precision and everything has to be done just so For years before the actual onset of a psychosis these subjects frequently withdraw from all former activity and limit their social activities They withdraw within themselves and become introverted in thought. They most frequently present a host of nervous symptoms which have been classed as neurasthenic While these characteristics partake of the nature of the frank psychosis they exist from earliest youth and may vary for years in different environments Under circumstances that are favorable they talk much of disease and poverty While the foregoing might be considered to be the basic state for the after-depression a large number of them develop manic attacks The weakness of the foregoing personality is often counterbalanced by superior mentality, attractive personality and goodness of heart, but even then the anxiety and effort to maintain self-confidence, the shrinkage from rough contacts and scrupulous conscientiousness outweigh the general picture and one is aware that the general psychic balance is kept at great personal cost. Coupled with this there is a feeble hold upon reality

The *manic* type of temperament is usually that of a poorly informed individual who does not persevere, is readily distracted and is indolent. For lack of general information these subjects often compensate by a sort of cleverness in minor matters and are even praised for a sort of alertness While they show good attention, perception and memory they have a narrow and defective outlook on the world as a whole Their judgment is hasty and shallow They develop no deep theory of life and seem indifferent to both past and future They naturally dispense with a sense of quiet anxiety and vain regrets of the depressive type of individual The mood is one of exaltation and self-confidence with over-valuation They are boastful and lack any thorough-going insight into their own disposition. They are devoid of real sympathy and often revile or tease others Proof against insult themselves, they often engage in practical jokes and games at the expense of their companions Unsteadiness and restlessness are everywhere present in their daily life They are always accessible and communicative, often seek to attract attention by dress or perhaps go to the other extreme and are slovenly They

soon tire of one fad and take up another. They are loquacious, quick at repartee, and always have an answer and an excuse. Their volubility and tendency to self-expression seems striking and they use a witty, bombastic or roughly abusive language according to circumstances. In school they are disorderly and play hooky, fail in examinations, stand military discipline badly, and are sexually precocious. They love whiskey and take to drugs at times. In drinking they often make no resistance. There is a fondness for low company and they also join all kinds of new movements. They take to out-of-door sports, and do all kinds of spectacular things. They show a great lack of proportion, of adaptation of resources to ends, of foresight and even when, as sometimes happens, they have a good business idea they ruin all by lack of common sense. Thus a man sent out an expensive advertising prospectus, spending his funds profusely and then when some orders came in had no goods to fill them. He said he was feeling out the market and no doubt thought himself very clever. His attempt at the last moment to fill the orders without any stock in trade, technical skill or manufacturing plant was comical. They are always at war with those about them, get into law suits of all kinds, are devoid of business tact, yet have no insight and cannot understand why their conduct is so objectionable. This kind of man, for one thing, is always broke or in debt and often is driven to fraud or imposition to get money. The condition just described shades into hypomania and may develop into it. In rare instances a momentary depressive phase contrasts with the basic state.

In certain cases this manic temperament is offset by some great accomplishment and passes as the eccentricity of genius. There may be general talent or a single special gift. These are the brilliant unbalanced characters. They show the genial warm nature which Kretschmer and Bleuler so often mention in the so-called "cycloid" and "syntonic" man. One can readily discern the weaknesses of the manic temperament.

The Schizophrenic or Dementia Præcox—Turning to the schizoid, one is impressed with the great prevalence of all sorts of physical abnormalities before the disorder, as such, has had anything to do with it. There are the well-known weakness, small statures, youthful appearances, malformations of the cranium, ears, high and narrow

palates, persistence of the intermaxillary bone, abundant growth of hair, strabismus, deformities of the fingers and toes, polymastia or defective development and irregularity of teeth. One may also add the not infrequent convulsions of childhood, obstinate nocturnal enuresis, frequent headaches, sensitiveness to alcohol and easy tendency to delirium in slight fever. Various attempts have been made to explain the gross presence of these unusual physical anomalies. Undoubtedly the causes are complex, not the least being the biologic incompleteness of the organismic capacity to integrate itself to a normal sex type. Unfortunately these physical defects connote a deeper splitting in psychic function than their mere physical presence would imply and it is especially to the latter significance that we must direct our attention. These psychic peculiarities often antedate the occurrence of the frank psychosis for years, indeed in the great majority they have been noted in childhood. For instance, Schultz found 50 to 70 per cent were possessed of psychopathic traits from the beginning, exhibiting a shy, quiet or irritable and capricious character. Karpas found in his cases 68 per cent were psychopathic, while Schott saw quiet or reserved characters in only 28 per cent. Kraepelin is willing to confirm these statements. He is, however, unwilling to attribute many of these psychic peculiarities to the essential substratum of make-up but rather is inclined to attribute them to the early effects of the disease itself. He believes that the fundamental disorder changes the personality before and aside from the psychosis itself and may even do this before the latter has manifested itself at all. The change in personality usually appears too early in development to show any transition period and it is too great a stretch of scientific effort to make the disease process antedate the usual psychotic picture so distinct as to include the earliest irregular behavior of such persons. Saiz's studies showed at least 74 per cent of incidence of psychopathic traits in his *præcox* material dating from earliest infancy, but, as he and others recognize, without an exact analysis of concrete material one may not arrive at any very precise estimate of the individual worth of the principle. Kraepelin in his analysis makes an effort to group the types of psychopathic traits, such as one for boys who were rather uniformly lazy, restless, had a great distaste for work and at the same time were greatly inclined to mischievous tricks. They did not persevere in any career

and finally became vagrants or criminals. In contrast with these was that of a minor group, also mostly males, who were conspicuous for their docility, good nature, anxious conscientiousness and diligence and as patterns of goodness held themselves aloof from childish naughtiness. Undoubtedly this latter type would fit in easily with the mildly shut-in type discussed elsewhere. In a previous study of the Heidelberg material Kraepelin found 17 per cent. were intellectually intact. In a third the intellectual endowment was fairly good and 7 per cent was poor. Two other investigators actually found a superior mentality in 6 per cent. It is, however, obvious that any piece-meal analysis of the make-up, even that of the whole of the intellectual endowment when taken alone, gets us nowhere. If it be conceded that the prodromes or early symptoms are generally present, may one say that all such material will produce the *præcox* psychosis in later life? This is a difficult question to settle offhand. We might surmise that certain psychopathic traits are very common and are not dissimilar to those precedent in the actual candidate for *dementia præcox*. In the same stock we often find vagrants, prostitutes, suicides, queer people and wrecks of all kinds. It is a mistake, however, to think such are really anomalous types of actual *præcox*. It would do violence to the facts unless the individual case studies showed that social dilapidation bore the marks of the syndrome picture. We may profitably analyze actual case material a little more closely. Parents often say of their insane children that "they were never like other children." In Boven's cases the first presented three eras in the development of the malady, and of these the third was full of incoherences. The second era, which had been four years before, was characterized by singular personality alterations. The boy became very apathetic and spoke of suicide. Previously gay, he became sad. Was this change of character itself a psychosis? It is impossible not to see a connection between the second and third eras. But was there something which antedated the change of character? This can be answered only by taking a careful history and considering the inborn substratum or first state. As a child the intelligence was average. He worked hard in school, although he found it hard to make the grades. He was taciturn, gentle, and without intimate playmates. Attached to his family, he showed aversion to the outside public. He was "too gentle," allowing his mother to bathe him until he

was fourteen years old Here one may see the germs of misanthropy, passivity and shyness, which strongly suggest dementia præcox even at this tender age

But this superposition or stratification of the disease is partly negatived when we see individuals who often seem to develop dementia præcox without prodromes like a bolt from a blue sky It has been urged that dementia præcox can develop on any kind of soil whatever To verify or antagonize this statement Boven took the histories of thirty individuals with dementia præcox with twenty of manic-depressive as control In these cases, the duration of apparently normal psyche had been fifteen to twenty-five years All were in the advanced stage, a severe type of dementia præcox, so that diagnosis cannot be questioned The results are as follows Twelve out of thirty were of substandard mentality Eight were gay, eight were sad, and the balance were between the extremes Twenty-one were "touchy," more than can be accounted for by chance These are described as either irritable, sensitive or excitable Eight were egocentric, and the same number of the opposed type, the balance being average The shut-in personality was surprisingly high, being twenty-four out of the thirty There were anomalies of activity in nineteen, the other eleven in this respect were normal These anomalies include the most opposed qualities such as impulsiveness, passivity and irregularity or spasmodic activity In this personality rating there is nothing to suggest the presence of an actual psychosis Controls of manic-depressives showed mostly normal intelligence, while disposition and temper also seemed average The majority were egocentric, there were few shut-ins and activity was mostly regular

One may quite agree with Boven that the original character determines the stability and equilibrium of the psyche and presages defects and sources of danger

The inherent peculiarity of the præcox subject which is shown at the socially adaptive level is a defect of social instincts and this defect explains the distrust, misanthropy, timidity, sensitiveness, autistic thought, etc In the præcox subject it naturally colors the delirium, etc., although the content of the latter is largely due to the natural intelligence and experience

Bleuler from actual case analysis believes that the psychopathic behavior is the onset, the initial manifestation of the disease itself.

Even in childhood these children may be called "crazy" by their schoolmates. The author rejects entirely the term "prodromes of schizophrenia"—they do not exist. Defects of intelligence are seldom noticed by the relatives, although well marked to the alienist at his first examination. He thus concludes that "it is questionable whether an individual predisposition exists." Doubtless many of the potential schizophrenics are in their youth peculiar, shut-in and autistic. It cannot be said whether this condition is natural or the first evidence of the disease. There is no relationship between the disposition and the intelligence. Elmiger and Lugaro mention the extraordinary number of examples of fineanlage, while the author's experience is such that he can exclude a majority of cases of inferiority. In other words, at least half are normal to start with. Climate, social position, etc., cut absolutely no figure.

Again we see that Bleuler as well as Kraepelin is unwilling to consider a primary constitution to exist quite independent of the psychosis of dementia præcox itself nor that when such traits are found as they do that they may essentially be singled out to specifically presage a dementia præcox in later life. Obviously here as elsewhere a still more detailed study of dispositional traits is necessary to make a type of preexistent and primary schizophrenic constitution an actual clinical entity.

It is evident that in the præcox patient there is much evidence of an endogenous substratum of definite character. This, of course, may suggest an organic alteration from the beginning. Common to præcox and melancholia is the very strong tendency to hypochondria. As a result of suffering, actual or fancied, the patients are continually complaining and lamenting. To the beholder the suffering is either exaggerated, or non-existent. But this, apparently, is not an innate primary quality in the make-up of the patient, being symptomatic of the disease. It was present in sixteen of thirty of Boven's præcox cases. Nevertheless one may isolate a small group of congenital hypochondriacs. Apparently this is an independent quality, and not part of the original præcox make-up.

In regard to the general subject of a basic predisposition in these psychoses, the affirmative has been taken by Esquirol, Falret, Griesinger, De Sanctis, Jelliffe, Voit, Bond, Abbot, and others, including Kraepelin, who traces dementia præcox back to earliest

infancy and will not allow that the constitution is separate from the disease as a whole. By another school, the opposite is claimed, that character and psychosis are entirely independent of each other, while at the other extreme Tiling traces all psychosis to the character. In the debate between Tiling and Neisser it is easy to see that the two radically opposed views do not exclude each other absolutely.

From what we have presented it may be rightly inferred that (1) dementia præcox is a distinct clinical entity with variations and subtypes, (2) that many dementia præcox individuals may show the characteristic symptoms more or less distinctly and constantly for years before the psyche becomes overpowered in its normal balance, (3) the occurrence of a state which is known as one of transition, a psychic alteration but distinct from the true picture of dementia præcox, is clinically possible but this point needs much more analysis, (4) that looked at retrospectively the great majority of dementia præcox cases present a wide variation of psychopathic traits or make-up but this is as yet by no means clear or specific for the majority of cases. Fundamentally one may say that the impure factors in the make-up are upon a psychopathic soil of much more intensive psychic degeneration or imperfect integration than perhaps any other psychosis. It is a substrate in psychopathic constitution even having in a large measure a great preponderance in an actual defect of physical make-up as well.¹

¹ A detailment of the peculiar psychic characteristics of the epileptic constitution in its more adult form may be gained from "The Epileptic Psyche," May and August, 1926, *Utica State Hospital Quarterly*. As to the psycho-analytic or subjective integration of epileptic narcissism, which is the essential nuclear formation of the character, this has been published in an article entitled "A Further Contribution to the Psychology of the Essential Epileptic," *Jour Nerv and Ment Disease*, June, 1926.

THE SIGNIFICANCE OF TRAUMA IN THE CAUDAL REGION OF THE SPINE *

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INJURIES at and around the coccyx, though known to have far-reaching results, seem to have attracted very little attention, judging by the paucity of the literature on the subject, and the scant mention by the text-book writers as to the underlying causative factors which are implicated in the production of the severe reactions which very often accompany seemingly slight traumata at the region of the coccyx.

Thus, Stimson, when discussing injuries of the coccyx, describes the symptoms very minutely and very thoroughly, but when he reaches the point where the underlying reasons for such reactions are to be discussed, he dismisses it with a short sentence that "the severity of the symptoms appears to be due to a special sensitiveness of the region"

Last year I was fortunate in encountering seven patients with injuries at the coccygeal region. One with a posterior dislocation; one with a partial fracture at the sacrococcygeal junction, and the other five seemed to be suffering from a sprain, as the rectal examination did not reveal any pathological condition, except a spasmodic contraction of the sphincter, and a great deal of tenderness at the sacrococcygeal junction. Six of these patients were women, and one a man. All had a history of trauma, and with the exception of the man who had a partial fracture, whose symptom was backache, all the other patients had severe symptoms, quite out of proportion to the amount of pathology visible to the naked eye or to the touch, as well as the extent of the trauma. The X-ray findings in many of these cases were not of great assistance. Albee¹ claims that the contour and position of the bone are readily ascertained by X-ray. My own experience with these cases makes me rather inclined to agree with Frazier as to the rôle of the X-ray as a help in the diagnosis

* Read before the Yorkville Medical Society, December 20, 1926

of these injuries Frazier points out the important fact that because of the small size and lack of density, compared with the overlying parts, it is often very difficult to show the coccyx satisfactorily

Most of the so-called fractures are in reality disjunctions, and can usually be diagnosed with more certainty by palpation than by Rontgen examination If united, the Rontgen diagnosis is uncertain, because inequalities and distortions are often seen in the normal subjects ²

In watching the patients who came under my observation, I became interested in the symptomatology, and the present paper is the result of my effort

SYMPTOMATOLOGY

Stimson, when speaking of the symptoms accompanying dislocation of the coccyx forward, describes the suffering of the patient very dramatically, thus, "the pain at the moment of the accident is so severe as sometimes to cause the patient to faint, there is pain on defecation, and frequent calls to urinate The pain radiates down the thighs, and sometimes over the trunk, heads and arms, the patient is unable to sit up, and the slightest movement may greatly increase the suffering Coughing and sneezing and sometimes every act of inspiration increase the local pain If the condition remains unrelied, in from one week to a month, the general health suffers seriously, the patient becomes feverish and the mind dulled "

REASONS FOR THE MARKED REACTIONS FOLLOWING COCOYGEAL INJURIES

Muscles Attached to the Coccyx—The muscles attached to the coccyx are four pairs and one single muscle On either side of the bone, the coccygeus anteriorly and the gluteus maximus on either side posteriorly, and exterior coccygeus when present, at the apex, the sphincter ani, and in front, the levator ani

The Actions of These Muscles—The coccygeus raises and supports the coccyx after it has been pressed backward during defecation and parturition The sphincter ani (external) being in constant tonic contraction, and having no antagonistic muscle group, keeps the anal orifice closed. It can also be put in a condition of greater contraction under the influence of the will, so as to more closely

occlude the anal aperture, as pointed out by Gray. The levator ani, attached to the sides of the apex of the coccyx, is a broad muscle situated on each side of the pelvis, and descending, unites with its fellow on the opposite side, to form the floor of the pelvis. It supports the viscera in the cavity, and surrounds the various structures which pass through it. The gluteus maximus, which in addition to its other attachments also takes origin from the posterior part of the coccyx, is the extensor of the femur, it also helps through its lower fibres to abduct and rotate the femur outward. It is therefore self-evident that all the functions which will have a tendency to call the respective muscles to action, *i e*, defecation, extension of the thigh, external rotation or even adduction of the thigh, will have a tendency to irritate the injured coccyx.

THE NERVE SUPPLY

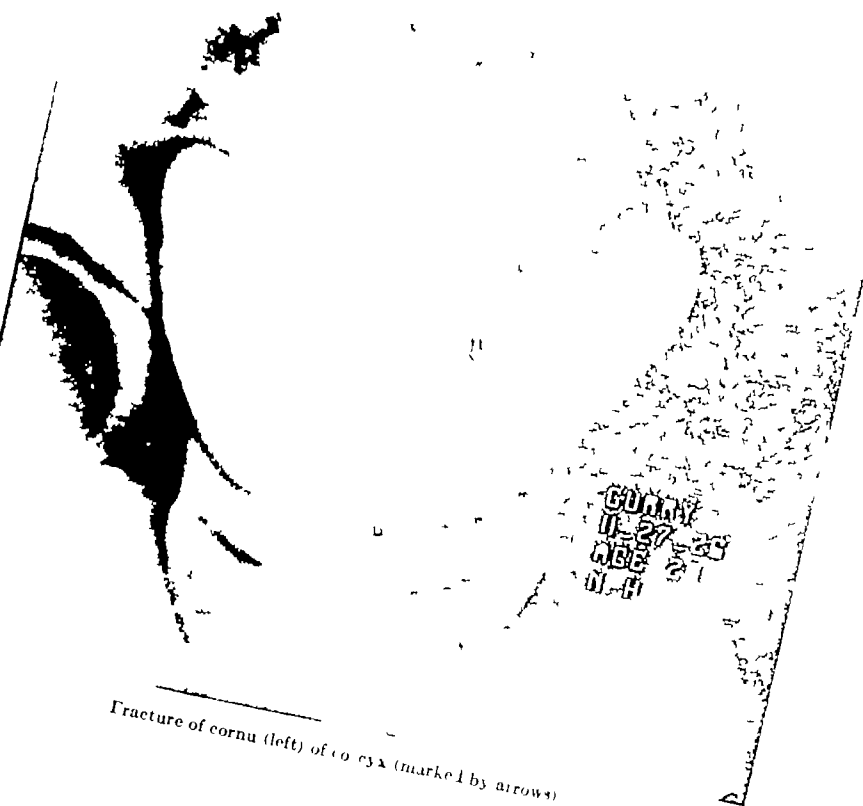
The nerve supply of the above-mentioned muscle group comes from the anterior division of the fourth sacral nerve, the exception being the gluteus maximus, whose nerve supply comes from the sacral plexus through the intercommunication of the various filaments making up the lumbosacral cord. It is important to note in this connection that the fifth sacral nerve makes its exit at the junction of the sacral foramen, which is formed by the lower part of the sacrum, and the transverse process of the first piece of the coccyx. The nerve, after its exit, communicates above with the fourth sacral nerve, and below with the coccygeal, and supplies filaments to the coccygeus muscle. The anterior portion of the fourth sacral nerve, in addition to communicating fibres which it sends to the fifth sacral nerve, also supplies branches to join the sacral plexus. The remaining portion of the nerve divides into visceral and muscular branches. The visceral branches are distributed to the viscera of the pelvis, communicating with the sympathetic nerve. They ascend upon the rectum and bladder, and in the female, upon the vagina, communicating with branches of the sympathetic from the pelvic plexus. The muscular branches, as mentioned before, are distributed to the levator ani, coccygeus and sphincter ani. From these emerge a number of cutaneous branches to the region between the anus and coccyx.

One can therefore understand the wide ramifications of the nerve supply which is directly or indirectly in touch with the coccy-



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Fracture of cornu (left) of occipital (marked by arrow)

CONT
II-27
AGE 2-30
N-11

geal region, and is either influencing or being influenced by the constant inflow of painful sensations

THE SIGNIFICANCE OF A RICH NERVE COLLATERAL IN THE INTERPRETATION OF THE CONDITION

The writer of this paper some time ago pointed out the fact that in the event of constant irritating stimuli entering the cerebrum, the mind's usual response to such stimuli is the attempt to locate the source, whence these irritating stimuli originate, and interpret their significance, and thus try to inhibit the acts which give rise to these painful sensations. However, since the mind has to depend for its correct interpretation upon the neurons which carry these stimuli to the cerebrum, it may happen that the source of the irritation may be overshadowed by the abundant nerve collaterals and other associating fibres before it reaches the mind, and in that way the mind will be at a loss to properly interpret the incoming sensations, with the result that the defence will also be misdirected. Hence, beginning flat-feet may at times give rise to severe backache, as well as pains in the upper extremities, without a feeling of undue irritation in the feet."

In this connection it is interesting to note that Jones and Lovett call attention to the fact that sometimes weak feet may be the cause of coccygodynia

THE SYMPATHETIC NERVOUS SYSTEM IN RELATION TO COCCYGEAL INJURIES

This subject seems to have received very scant attention, although the influence of the sympathetic nervous system seems to be far-reaching in sacrococcygeal injuries, and incidentally the above seems to be the only plausible reason for the prevalence of the female sex among the patients who suffer as a result of trauma at that region, due probably to the fact that women have a greater sympathetic supply in the pelvic region

THE ABDOMINAL AND PELVIC PORTIONS OF THE SYMPATHETIC NERVOUS SYSTEM

The abdominal and pelvic portions of the nervous system are distinguished by the extensive and strong plexuses, which here represent the peripheral part of the sympathetic system, and in com-

parison with which the sympathetic trunk becomes insignificant. The sympathetic trunk of the abdominal cavity and pelvis includes the four or five lumbar ganglia, four sacral ganglia, and the unpaired coccygeal ganglion, known as ganglion impar. The sacral ganglia are about equal in size to the lumbar, but diminish from above downward. They lie in front of the pelvic surface of the sacral bone, medial to the anterior sacral foramina, so that the nerves of the two sides converge below, both trunks finally uniting in the ganglion impar at the coccyx. They are connected by relatively thin portions of the trunk, and here the trunks and ganglion of either side anastomose by transverse branches to a much greater extent than do the lumbar ganglia. In addition, the sacral ganglia give rami communicantes to the anterior branches of the sacral nerves, and are thus connected with the hypogastric plexus.

The coccygeal ganglion is unpaired and usually small or replaced by a small plexus. Through its communicating rami, it anastomoses with the fifth sacral and the coccygeal nerve.⁶

The ganglion is at the junction of the sacrococcygeal region, and injuries in that region have therefore a wide area of distribution through its rich ganglionic and sympathetic response. With the result that traumata, which elsewhere would probably produce minor and significant reaction, would, when occurring in the sacrococcygeal region, be followed by reactions so marked as to justify the claim that the patients become neurotic if not treated intelligently.

TREATMENT

The patient should be put to bed, hips slightly flexed to relax the glutei, the coccyx, if dislocated, can be manipulated into place by direct adjustment, and then followed by insertions of rectal suppositories of grains ten of Orthoform with oil of theobromate, twice daily. The bowels must be kept loose in order not to put a strain upon either the sphincter or coccygeus muscle. After the lapse of two weeks, mild stretching of the sphincter, and massage at the sacrococcygeal junction, in order to help reduce adhesion from the nerve exit, seem to have a salutary effect. Diathermia applied to the region may at times hasten the resolution of inflammatory reaction. Operative removal of the coccyx should be left as a last resort, not to be undertaken without a great deal of deliberation. It is true

that the operation is easy, but the results of the operation are not always those that the surgeon desired as far as the improvement of the patient's mental condition is concerned. In my seven cases, conservatism, endurance and patience worked admirably to the satisfaction of all concerned—myself included. Two of those patients were being prepared for a laparotomy before I was called in consultation, and two were advised to have the coccyx removed.

My conservatism has therefore helped two of those patients to return to normalcy, with their pelvic organs *in situ*, and the other two to have and to hold what nature has originally intended them to have, in order to remind them of their animal kinship, namely, the tail of the spine.

In the discussion which followed the reading of the paper, Dr Raphael Lewy expressed surprise that I have failed to mention the "filum terminale" of the spinal cord as an influential factor in the production of the symptoms complicating trauma at the coccygeal region.

Frazier, in his book on "Surgery of the Spine and Spinal Cord," calls attention to the fact that the filum terminale is the thread-like prolongation of the lower tapering end of the spinal cord, the latter known as the conus medullaris, and that the filum is distinguishable as a fine glistening filament, essentially a prolongation of the pia mater, covered by a sheath of arachnoid, and therefore consists chiefly of fibrous tissue.²

My own investigation and observation of laminectomized animals make me conclude that the filum terminale plays a very insignificant rôle in the symptomatology of caudal injuries.

In conclusion I want to express my obligation to the Medical Superintendent of the Neurological Hospital, Dr Thomas I. Price, and to Dr Reginald H. Sayre, for their pleasant cooperation.

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BUNION—ITS CAUSE AND CURE

By H. A. ROBINSON, M.D.

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MORE people are afflicted with bunion than with any other one affliction to which the human family is heir, and yet fewer operations have been done for this hideous and painful deformity than for almost anything else that one can think of. Why should this be so? It seems to me that results thus far obtained have not been such as to warrant an operation being done except in extreme cases, for it incapacitates the patient for a long time so that few can afford to take the time for convalescence. I shall not make a long résumé of the literature previous to 1918, but will be content to go back to the 1888 edition of Wyeth's "Surgery," in which he says that

Hallux valgus or displacement of the great toe toward the fibular or outer side of the foot is a common deformity and in exaggerated instances mechanical or surgical interference is demanded. Hallux valgus is caused chiefly by shoes which are pointed at the tip and are too short for the foot.

The action of the muscles inserted into the base of the great toe must not be altogether overlooked in the etiology of this deformity. Of the five muscles which arise from the tarsus and metatarsus and are inserted into this toe, all but one tend to carry it toward the fibular side of the foot. Mild cases of hallux valgus may be cured by elastic tension steadily applied. In severe cases operative interference alone can restore the toe to its normal position. The operation consists of an incision made along the inner side of the foot, the centre of which is over the angular projection at the end of the metatarsal bone. The callosity should be removed, the joint opened, a wedge shaped segment removed from the end of the metatarsal bone and the phalanx. Enough should be removed with the exsector or metacarpal saw to permit the bones to be brought into proper position, where they should be held by a silver wire suture passed well into the bone half an inch from the cut surface, or the bone may be held in apposition by transfixion with small steel drills.

This operation is preferable to that of osteotomy of the first metatarsal bone just behind the articulation, for the reason that the callosity and projection opposite the joint can only be removed by excision.

Walsham and Hughes, in their 1895 edition on the deformities of the foot say, "Hallux valgus is the term applied to a partial outward dislocation or displacement of the great toe at the tarsometatarsal [metatarsophalangeal?] joint."

ETIOLOGY

Many theories have been advanced to account for hallux valgus. They may be considered under the heads of mechanical, ligamentous, muscular and arthritic causes.

Mechanical Causes—The displacement of the great toe is undoubtedly, in our opinion, in the greater number of cases, due to the wearing of boots with median pointed toes. This is the view taken by Hoffa, and insisted upon by Ellis. Bradford and Lovett consider the deformity is entirely the result of improperly shaped boots, and affirm that barefooted people never suffer from it.

On the other hand, Redard regards the boot as only an occasional cause, for he says, "How can we explain hallux valgus in patients who have never worn boots, or at least boots which never trouble them?" Mr. Anderson also, although he admits that the majority of cases are undoubtedly provoked by ill-shaped boots, considers it very probable that some, and especially those of an aggravated type, are dependent essentially upon an irregularity of development and unconnected with any vice in the foot covering.

It is at least certain that some examples of extreme deformity are confined to one foot, the opposite member being of normal shape, a fact that strongly negatives the boot theory, and there are also bilateral cases in which the form of the distortion and the history given by the patients and friends make it equally difficult to accept the common explanation. Further, there are patients who insist that the toe went wrong by itself and had nothing to do with the boot. We are quite ready to admit that there may be other causes such as arthritis, gout, and possibly some developmental defect, in by far the greater number of cases boots are the cause.

We have frequently had patients declare that the boot had nothing to do with their trouble, that they had always worn good boots, while on inspection of the boots we have found them of the ordinary ill-shaped pattern of women's boots sold by low-class tradesmen, and on further inquiry have found that the patient had always worn them of the same shape. Indeed we are doubtful if cheap scientifically shaped boots for women are to be obtained. The deformity is only slowly produced through a series of years, and it is probably not till some accidental rubbing or other slight injury

causes the bursa, which has been gradually forming, to become inflamed, or the overlying corn painful, that patients' attention is called to it, hence the persistence with which they declare their trouble had nothing to do with boots. It is no uncommon thing for patients attending the orthopædic department to take umbrage even at the suggestion that they have worn ill-shaped boots, and even on our pointing out the defect, it is difficult to convince them that the faulty shape is not all that is desirable.

The treatment, according to Walsham and Hughes, is manipulative, mechanical and operative, all of which can be studied by referring to their work on deformities of the feet.

Years after the above work appeared Dr Charles H Mayo wrote a very scholarly article on the subject of bunion, showing in a comprehensive manner the theories and technic of the operation done at the Mayo Clinic, so I will not repeat it here, for surgeons are no doubt conversant with these methods.

We will now pass on to 1918, to the September number of *Surgery, Gynecology and Obstetrics*, where you will find an article by the author of this paper, excerpts of which follow here

Bunion is a dislocation of the metatarsophalangeal articulation of the great toe. Contrary to previous theories, it is not produced by tight, ill fitting shoes with high heels or pointed toes but is caused by pressure from within.

Heredity is a great factor in the development of these deformities, parents or relatives not far remote who have been so afflicted can be traced in almost all cases. For instance, the first patient operated upon by my method had three sisters and two brothers with hallux valgus and their father was a great sufferer from the condition. The next patient operated upon said that her father died when she was a little girl, but she remembered that his feet were like hers. I could enumerate many cases to strengthen this theory, but it is an easy matter for any who wish to investigate for themselves to find further examples.

Dwight has described a supernumerary bone which occasionally exists between the bases of the first and second metatarsals and to this bone he has given the name of intermetatarsem. J K. Young believes that Dwight's bone is the cause of some cases of hallux valgus, and that its early removal arrests the condition and relieves all symptoms.

I shall consider only two forms of bunion. First, the usual type which develops on the inner side of the great toe joint (and by inner and outer I refer to the foot with reference to the middle line of the body and not the median line of the foot). In this form of bunion the head of the metatarsal bone is displaced inward. In the second form the head of the metatarsal bone is displaced upward and there results a bunion on top of the foot. The cause is the same in each case and the only difference is the direction from which the villain attacks the innocent unsuspecting first metatarsal bone.

The onset is very insidious and the patient is unaware of his predicament until the joint is considerably enlarged and the foot swollen and painful. Then in looking for a cause he invariably blames the shoe for an offense of which it is entirely innocent. Many times the shoes are discarded and new ones take their place. The patient tells the shoe fitter that the old shoes were too tight across the ball of the foot and suggests a size wider. This relieves for only a short time because the head of the metatarsal continues to spread and soon a size larger is needed. This process is continued until the feet are unsightly when a chiropodist is consulted. He again blames the shoe for the trouble and tries all sorts of apparatus for the relief of the deformity. Yet it stays, and this is not surprising since we believe we know what causes the trouble. If bunion is a dislocation of the head of the metatarsal bone inward towards the median line of the body, how could a tight shoe produce it? I can show numerous cases with enormous bunions and almost complete dislocation of the joint, who never wore a tight shoe, then, too, I can show a great many people who have worn very tight shoes all their lives and have no signs of bunion. In all cases of bunion, large or small, whether they have worn tight, pointed toed shoes, high heels or broad roomy shoes, there is one thing in common which I claim to be the cause, namely, enlarged sesamoids.

The two sesamoids which develop normally under the head of the first metatarsal bone enlarge and grow downward and outward toward the head of the second metatarsal, and as the plantar fascia is tough it resists the sesamoids and with each step pushes them upward and inward and causes the head of the metatarsal to give in the line of least resistance, which is upward and inward.

Because there is no pressure inward on the proximal phalanx of the great toe, it is held firmly by the strong ligaments and gradually the head of the metatarsal is displaced inward. This turns the great toe outward toward the outer toes until in many cases the head is almost completely dislocated from the articular surface of the phalanx. The röntgenograms show that this dislocation corresponds to the size of the sesamoids.

Bunion occurs on top of the foot when the sesamoids are enlarged and point straight downward toward the sole of the foot. The tough plantar fascia forces the sesamoids upward against the head of the metatarsal so as to displace it perpendicularly upward and the phalanx being held firmly to the tendon is not displaced. This produces a bunion on top of the foot. The cure in both cases is the same, namely, removal of both sesamoids. By way of preventive surgery, I would advise the removal of both sesamoids as soon as the first symptoms of bunion are discovered, which can be readily done by the X ray. Then no further development can take place and the patient will be spared the hideous disfigurement of the feet as well as the suffering which eventually comes if operation is delayed.

In February, 1919, I read a paper similar to the above to the chiropodists of Wisconsin at their annual meeting at Milwaukee, which was published in *Pedic Items*, of New York, for June, 1919. The July, 1919, *Pedic Items* contained an article by Doctor Schuster, of New York, in answer to the June article, in which he said the Robinson article is interesting from the fact that its author advanced

a theory concerning the etiology and cure of hallux valgus or bunion that is radically different from those that have heretofore been accepted as correct, then goes on to express serious doubts as to the correctness of this theory Doctor Schuster continues and says "The points of interest brought out in the article under consideration are (1) that hallux valgus is not produced by an incorrectly shaped shoe. (2) That hallux valgus consists primarily in a displacement of the head of the first metatarsal bone inward toward the median line of the body (3) That hallux valgus is produced by the action of the sesamoid bones which have become enlarged and are displaced into the intermetatarsal space between the heads of the first and second metatarsal bones (4) That the cure consists in the removal of both sesamoid bones "

Doctor Schuster then says, "Let us quote what our orthopaedic surgeons of prominence have to say about points Nos 1, 2, 3, and 4," and proceeds to quote from Walsham and Hughes' work published in 1895, or twenty-four years before, to refute theories of 1919, and winds up his article by saying, the sesamoid theory if accepted at all must be accepted on faith, as it collapses under cool reasoning

After writing for a reprint of the *Surgery, Gynecology and Obstetrics* article Dr J J Monahan publishes an article on bunion in the *Medical Times*, of New York, for July, 1920, in which he says

In spite of the considerable amount of recent literature on the etiology of bunions, and the increasing interest in the subject evidenced by such writings, practically nothing has been added to our knowledge concerning the fundamental cause of these deformities Indeed a review of the recent literature along this line reveals a great diversity of opinion, founded in most part upon speculation and conjecture rather than real proof

That pressure and friction upon the head of an adducted metatarsal produce an enlargement of that head and the painful bursa termed bunion, is accepted by all without question.

As to the cause of the adduction of the metatarsal, however, there are many and varying hypotheses, foremost among which we find shoes, dislocation of the sesamoids and heredity The hypothesis so long given absolute credence by the whole medical world, that to ill-fitting shoes might be attributed all the ills of the feet, is fast losing ground The theory is too obviously assailable to go long

unchallenged That the modern shoe is responsible for much foot pain is beyond question, but that it is, as has been repeatedly claimed, the sole cause of bunions, is a theory insufficiently supported by fact. If shoes are the sole cause of bunions, should not the bunions be invariably bilateral? Yet what observer of the feet does not find conspicuously displayed upon his records that cases have an extreme bunion on one foot and none at all on the other? Even in cases showing bilateral bunion deformities they are rarely of equal development.

If bunions are caused by shoes, should not all wearers of inharmonious shoes acquire them, and all wearers of sensible shoes be exempt? Yet it is a noticeable fact that bunions seem limited to the wearers of no one type of shoes. No class seems exempt from bunions, the toe dancer, the nurse, the business man, the farmer, and even the unshod South Sea Islander, all come in for their share of these deformities. Judging from the evidence at hand it would seem that shoes have nothing to do with the primary causation of bunions. Doctor Monahan then says, "Another theory put forward as to the cause of bunions is the dislocation of the sesamoids."

Although the most recent, this theory is even more dubiously supported and more untenable than that of "shoes" and would seem to imply a complete lack of discrimination on the part of its sponsor between cause and effect. Opposed to the foregoing theories we find that of heredity—a theory used to explain not only bunions, but an endless array of other afflictions as well.

Before advancing this as a legitimate explanation of any deformity it would seem necessary that the exponents of this theory define the word Heredity! The term is as elastic of meaning as is the human mind of conception.

I am unable to accept any one of the foregoing as the fundamental cause of bunions, to do so means a complete ignoring of things as they are. A study of numerous cases of bunion-deformed feet in stero reveals very clearly an adducting element, and it needs but a logical interpretation of the evidence at hand to disclose the true etiology of these deformities. Briefly stated, it is the development of a supernumerary bone within the first tarsometatarsal

articulation that adducts the first metatarsal and is therefore the direct mechanical cause of bunions.

In the November, 1920, issue of the *American Journal of Medical Sciences* Doctor Monahan, in writing on human pre-hallux, says, "Popularly all the supernumerary bones occurring in human feet are looked upon as accidental structures. We feel safe in asserting that Nature does not produce the same 'accidental' structure again and again in the same anatomic position. When such a structure repeatedly appears it is time to forget its 'accidental' character and recognize it as the fixed and fore-ordered result of some fixed cause."

"It is directly homologous with the pre-hallux as seen in many of the lower animals and had its ancient origin, doubtless, in some ancestral form of the past that was common to all succeeding types."

In the year-book of 1921, Dr E R Ryerson, of Chicago, in writing on end-results of hallux valgus, quotes several authors, among them J J Monahan's article in the *Medical Times*, of New York, and while he agrees heartily with the doctor on two points, he disagrees on the shoe question, and says, "To the clinician who every year sees large numbers of persons who have well-pronounced lateral deviations of the first metatarsal bone, the etiology of hallux valgus seems to require no elaborate studies or theories. The condition can be so logically and clearly demonstrated to be due to improperly shaped or fitted shoes that it is a waste of time to search for other causes." Then he says, "It is perfectly true that the immediate ancestors of many patients can be shown to have hallux valgus. This, he says, proves nothing whatever as to heredity except that the parents or grandparents had the same partiality for pointed shoes that is present in the descendants, or else that the shoemakers had a hereditary tendency to make abducted shoes."

Doctor Seaver, of Boston, in his work on orthopaedic surgery for nurses says "There is no question but that it is a shoe deformity, and if people did not wear shoes they would not have bunions." And then says, "One often hears the explanation that it is a hereditary deformity, but this cannot be accepted." Further he says, "There are only two methods of treatment for this deformity. One is to wear a shoe which is wide enough with a straight inside edge to prevent pressure on the bunions. The other method is entirely by

operation The operation is designed to remove a part or whole of the head of the first metatarsal bone, to lengthen the extensor longus hallucis tendon and place the toe in the same axis as the first metatarsal bone. Following this operation narrow shoes cannot be worn without a recurrence of the deformity "

Now that I have made the quotations above enumerated, I want it distinctly understood that I have no cause of grievance with any of the writers, even though my theories are diametrically opposite to theirs I shall endeavor to prove that I am right and that they are wrong, even though I may not succeed, but if I fail to persuade the orthopædic surgeons and others to my way of thinking and doing, I shall continue right along in the direction I have been travelling since my first bunion operation, done in 1917

When my article in *Surgery, Gynecology, and Obstetrics* was published, I had but four or six bunion operations to my credit, but my theories have not changed since then, and I am more strongly convinced on every point than I was then—and why should I not be with five hundred successful operations as evidence? I have come to believe that bunion is as simple (theoretically) as A, B, C, and that there is nothing more positive in surgery Sir Robert Jones has said that an operation for bunion should not be undertaken lightly, to which I heartily agree, for I know the dangers and the hard work connected with such an operation My operation is much harder and more tedious than the operations done by others, but the results are worth the effort I think it is an accepted fact that there is but one cause for tuberculosis, diphtheria, and so on—how can we reconcile a dozen or more causes for the deformity called bunion?

As a matter of fact, there is but one cause or possibly I ought to say a combination of two elements that produce bunion, and that, as I have stated before, is the action of the sesamoids, plus a hereditary weakness or tendency.

If this is right there is little wonder that I have done so many operations, but, if it is wrong, how have I been able to get away with it? I presume Doctor Ryerson would say it was just a case of a fool for luck, which would be as logical as his statement that the condition can be so logically and clearly demonstrated to be due to improperly shaped or fitted shoes, that it is a waste of time to search for other-

causes He admits it is perfectly true that the immediate ancestors of many patients can be shown to have had hallux valgus, but says this proves nothing whatever as to heredity I do not pose as a specialist on heredity, but I will say that if people used as much discretion in choosing a mate to rear a family of children as farmers use in mating horses, cattle, sheep, pigs and fowl, there is no doubt but that in a few generations we would have a much better race of people

Bunion is a dislocation of the metatarsophalangeal articulation of the great toe

According to my theories, it is produced by the action of the sesamoid bones which are situated underneath the head of the first metatarsal bone, plus a hereditary tendency or weakness of the ligaments surrounding the joint The sesamoids are cartilaginous in the early years but have an ossification centre which commences to develop and become hard and as this centre of bone enlarges, it grows downward and somewhat outward toward the second metatarsal and with each step it pushes upward and inward and gradually stretches the ligaments, which allows the joints to dislocate, and after a time it has caused so much separation of the first and second metatarsals that the outer sesamoids roll up between the bones and in extreme cases both sesamoids are completely out from under the head of the first metatarsal and up in between the two metatarsals so that a lateral X-ray view does not show them at all

What adducts the great toe? The proximal end of the first phalanx is concave, only a part of that concavity shows in an X-ray for the reason that the long inner point being cartilage does not show in the X-ray, which shows only the ossified portion, but when the round head of the metatarsal is pressed inward the long point of cartilage has to go forward to allow the head to dislocate inward and that causes an abduction of the great toe and that abduction is in proportion to the adduction of the head of the metatarsal Figs 1-21 will illustrate my point. The first is a sketch where the sesamoids are in their normal position under the head of the first metatarsal The round head of the metatarsal sets squarely in the concavity of the proximal phalanx and you see the metatarsals are one-eighth inch apart and there is no dislocation

FIG 1

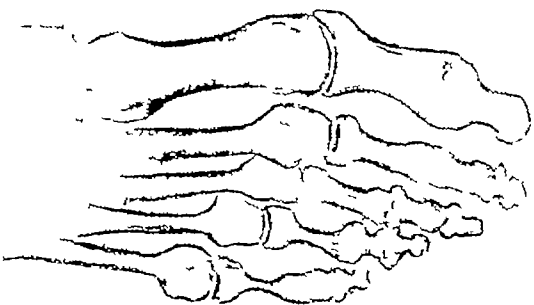


FIG 2

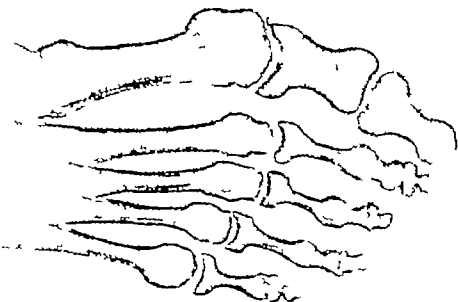


FIG 3

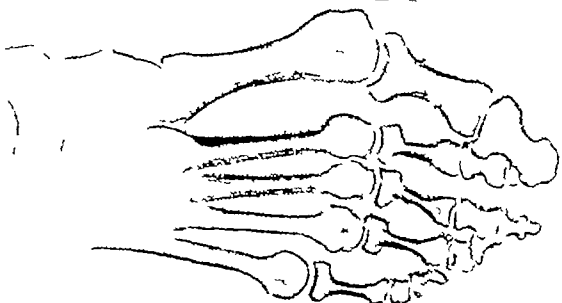


FIG 4



- FIG 1 —A sketch made from a skingraph where the sesamoids are in their normal position and the first and second metatarsals are about one eighth inch apart and there is no dislocation
- FIG 2 —Here the metatarsals are about one-fourth inch apart and more of the outer sesamoid
- FIG 3 —Shows a greater separation of the metatarsals and more displacement and the toe is abducted more than in either one or two
- FIG 4 —Shows a still greater separation of the metatarsal bones and almost complete dislocation of the joint with both sesamoids up in between

FIG 4a



Shows a pair of absolutely normal feet at least as far as bunions are concerned

FIG 5



The feet of a young lady 25 who has been a great sufferer with bunions and there is marked dislocation of the joints

FIG 6



The same feet a few minutes later bandaged tightly and you will see that the dislocation is reduced showing that bunion is not an overgrowth of bone

FIG 7



The same feet two weeks later minus the sesamoids and they are without bandages or compression of any sort

FIG 8



A large wedge shaped supernumerary bone the intermetatarsocran of Dwight but the sesamoids are in their normal position and there is no bunion

FIGS 9 AND 10



FIG 9 —Represents a pair of bunion feet just before the operation on the right foot began
FIG 10 —Shows the incision through the skin and fascia

FIGS 11 AND 12



FIG 11 —Represents the long tendon just as we dissect or tear through the sheath and the scissors are in the sheath ready to be forcibly opened to expose more of the tendon to allow it to be drawn out in plain view

FIG 12 —Shows the long tendon being drawn out so that the dissection of the sesamoids may proceed without so much danger of severing the long tendon

In Fig 2 you will see the metatarsals are separated about one-quarter inch and slightly more of the outer sesamoid shows in between, and there is a slight dislocation of the bunion joint

Fig 3 shows a greater separation of the metatarsals and more dislocation and the toe is abducted more than either of the others

Fig 4 shows a still greater separation of the metatarsal bones and almost a complete dislocation of the joint with both sesamoids up in between so far that a lateral view per X-ray does not show them All these sketches are made from actual X-rays and are not exaggerated

I will now present some X-rays to show a real case before and after operation.

Fig 5 shows the feet of a young lady twenty-five years old who was operated in August this year The feet are just natural.

Fig 6 shows the same feet fifteen minutes later, bandaged tightly, and they show the dislocation completely overcome and look quite normal, but of course she could not stand the bandages very long

Fig 7 shows the feet two weeks later and after operation, minus the sesamoids, and in two weeks and two days she went home wearing a double A shoe and walking nicely

I will now present a picture (Fig 8) of a foot X-rayed for possible injury to the bones, which has a supernumerary wedge-shaped bone in excess of half an inch, and you will see that the sesamoids are in their normal position and there is no adduction of the metatarsal bone or abduction of the great toe I can show you dozens of such examples if necessary

J K Young as far back as 1910 said he believed this bone of Dwight's was the cause of some cases of bunion and its early removal would relieve all symptoms

I believe it is good logic, if you know the cause of a trouble to remove that cause, and J K. Young had the courage of his convictions and advocated the removal of this supernumerary bone, but the author of the *Medical Times* article goes down and removes the prominence at the ball of the foot, which would seem to indicate that he was not sure of his ground

I shall endeavor to explain the technic of the operation to remove the sesamoid bones for bunion. An incision is made along the

inner side of the bunion joint at a line about where the sole of the shoe and the upper come together so that there will not be pressure on the scar below or on the side, the middle of the incision is about even with the prominence of the bunion and it goes through the skin and the fascia, then you follow downward to the lower point of the sesamoid, being very careful to do blunt dissection or tearing so that you do not cut off the long tendon which lies between the two sesamoids. Now when you see the glistening tendon shining below the sesamoids, put your scissors in over the tendon with the blades closed, and when you have them in the sheath, open them strongly, tearing the sheath so that you have room to bring the tendon out on a retractor and keep it in sight all through the operation.

Now commence to dissect up along the inner side of the inner sesamoid until you get to the articulation of the sesamoid and metatarsal and cut through into the joint and dissect both sesamoids out together, keeping close to sesamoid front and back (for it is easy to cut off the long tendon), until you have them dissected out.

In dissecting up to the top of the sesamoids you go between the bursa and the sesamoids and when they are out take an elevator and follow up between the bursa and the head of the metatarsal and then pry the bursa up over the head so that if you wish to take off some of the prominence for cosmetic purposes you can do so with a small carpenter's chisel and a curette to smooth the edges off. Never put your finger in the wound, if you wish to explore to see if you have removed sufficient of the prominence you palpate through the skin. When your trimming is satisfactory, drop bursa and skin down over the head of the bone and proceed to suture the tendon. Take a curved ligature carrier with a needle point and put it through the short end of the tendon in the right foot from the outer side and bring the needle's eye out through the wound so the nurse can thread it with silkworm-gut and pull it back through and unthread it from the needle, then put your needle through the tendon just back of where the sesamoids were removed and let the nurse thread it again with the same end of the silkworm-gut that you brought through the short end of the tendon. Now you have two ends of the silkworm-gut out through the wound and through both ends of the tendon. Now take a curved needle in a needle holder and put it through the sole of the foot near the phalanx and thread it with the back end of

FIGS 13 AND 14

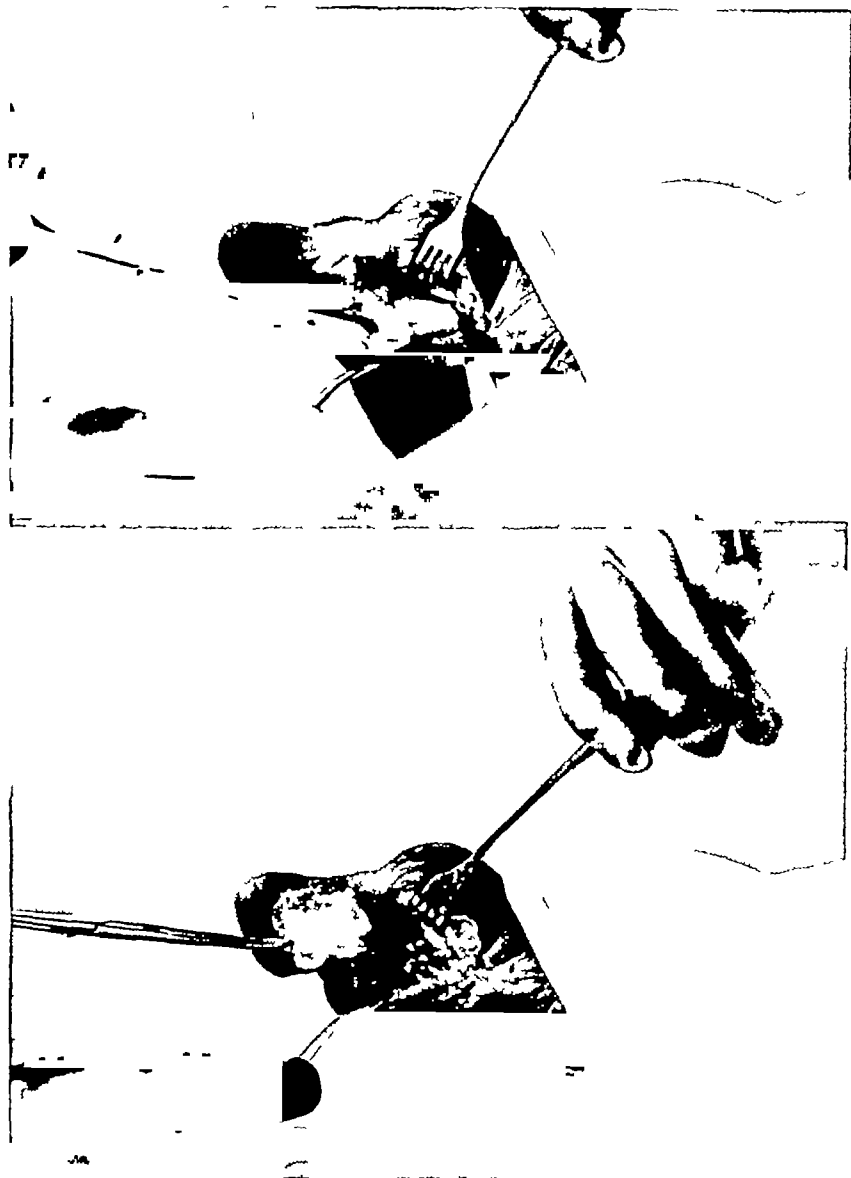


FIG 13 —Shows the sesamoids pretty well dissected out

FIG 14 —Shows the sesamoids where one clip with the scissors will release them and you see the cavity out of which they have been taken

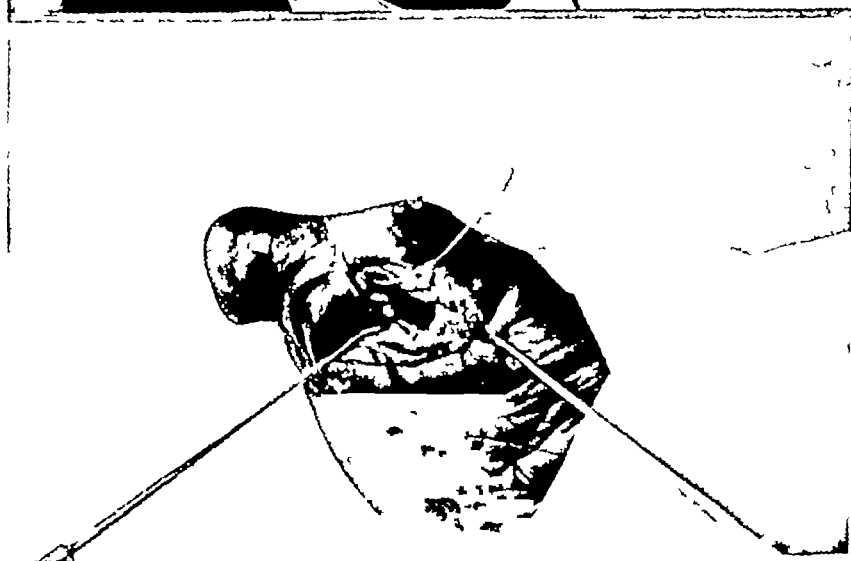


FIG 15 —Shows the head of the first metatarsal bone protruding through the wound ready if in the judgment of the operator it needs trimming for cosmetic purposes the tendon as you will see is held out of harm's way with a retractor

FIG 16 —Shows the first step in suturing the short tendon which has been severed by the removal of the sesamoids. At the left you see a long handled curved needle threaded with silk worm gut. When this needle is pulled through the tendon at base of proximal phalanx it pulls the end of the silk worm gut through into the deep cavity. the needle is then unthreaded and that same end is threaded into the curved needle of the right-hand handle which is pulled through tendon and comes out where the right hand handle is seen at back end of incision

FIGS 17 AND 18



FIG 17 —Shows two curved needles one at front of wound and the other at the back end of wound. Now the silkworm-gut at back of wound is brought toward end of toe and threaded through front needle and the front end of silkworm-gut is threaded through the back needle. Both needles are seen to be outside of the long tendon or in other words toward the little toe side of the foot compared to the tendon. Now both needles are pulled through sole of foot.

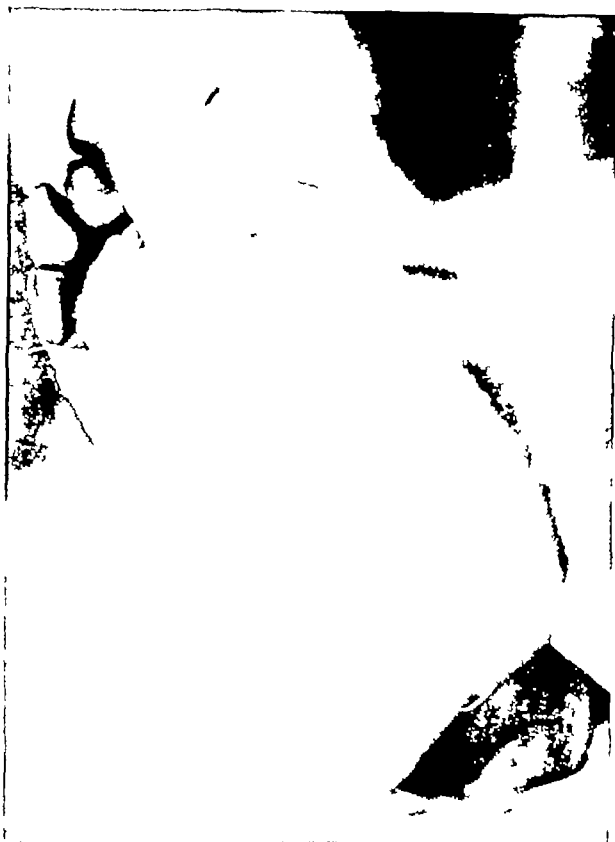
FIG 18 —Shows this tendon suture through sole of foot as well as the two mattress-sutures through the bursa one at the posterior portion of bursa and the other toward the front of bursa and through sole of foot. Your forceps is still holding the tendon.

Fig 10



Shows all three sutures through sole of foot tied over three small rolls of gauze bringing the buran down so it is held tightly to plantar fascia of foot and you will see the position of the long tendon now that it is transplanted it is nearly an inch from its old location and ought to hold big toe straight

FIG 20

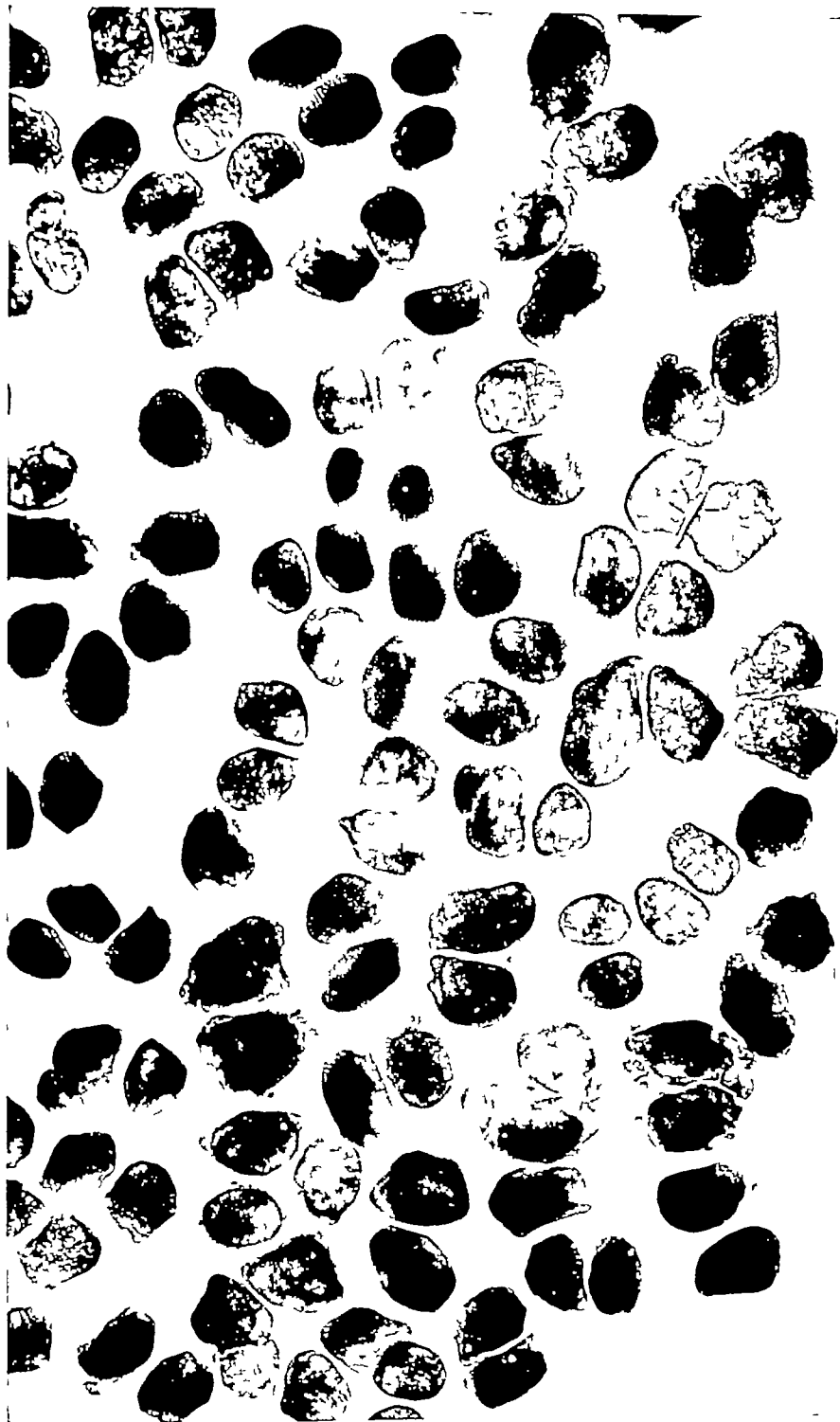


Dressing applied to foot after removal of the sesamoids by the Robinson operation

FIG 21



End result portion of bandage removed to show healed wound



Sample from the numerous sesamoids removed by the Robinson operation. (Natural size)

the silkworm-gut and pull it through the sole of the foot and be sure you have put it through to the outer side of the long tendon which is being held toward the median line of the body with a retractor, now put your curved needle through the sole of the foot in front of back end and outside of the tendon, the long tendon, and thread it with the front end of the silkworm-gut and pull it through the sole of the foot as before. Put a small hemostat on this silkworm-gut and drop it. Now you see you have a figure-of-eight suture in the short tendon. Still holding your long tendon out of the wound toward the median line of the body you put two mattress-sutures through the bursa, then without the figure-of-eight you put those through the sole of the foot with your curved needle and outside of your long tendon and when these three sutures are tied over little rolls of gauze, separately, then take off your little retractor and drop your long tendon and you will see that it lies just between the fascia and bursa, then you suture the skin with *Dermol*, mop the wound with iodine and cover with gauze and take a wooden tongue depressor, wrap it tightly and put it under the big toe and wrap adhesive around big toe and splint and see that the toe is straight and bandage very tightly to hold foot together (Figs 9-21)

Now if there are no indications for removing dressing leave it for six days and then remove and clip silkworm-gut stitches so as not to get pressure necrosis, but leave the silkworm-gut in for another week and then it will come out very readily, but in six days it is likely to give trouble if you try to pull it out. At the end of two weeks take off dressing and remove stitches, and if necessary put a pad of gauze between the great toe and the second toe to keep big toe straight and fit the patient at once with the narrowest shoe you can crowd his foot into, but be sure it is plenty long enough and a straight last, because the toe will be longer than before operation. Have the patient stay off his feet two or three days longer and not soil the shoes, then he will be able to be fitted with a size or two narrower, and then he can walk round. Strange as it may seem, after this operation a tight shoe feels better than a loose one, which I think is pretty good evidence that we have removed the cause, for before the operation they could never wear a tight shoe. Now it stands to reason that a foot which has been deformed so long will not stay in place if not held there, so my rule is that the patient must

wear the shoes day and night for six months until the ligaments and other tissues have had time to shrink and become so solid that they cannot spread. Another item to be remembered is that as soon as the shoes become loose either put in an insole to cause the shoe to hold the foot tight or else get a new and narrower pair, for there is more or less swelling which will leave and that must be compensated for by narrower shoes.

By the way, never operate one foot but always both, even though the one may be very small and not cause much trouble, for after operation on one foot it will take a narrow tight shoe, and the patient cannot stand a tight shoe on the one not operated, so the feet would be mismated. It may sound strange to say, wear shoes day and night, but it is the thing to do if you want the nicest possible results, but if it is comfort alone and the patient does not care for cosmetic results, then it is not necessary. The shoes should be removed each morning and night and the feet sponged off with cool water and soap and then dried and fresh stockings put on and the shoes replaced.

Age is no bar, for I have operated all the way from twelve years to seventy-one, and all seem to be able to be fitted in a certain number of days. I have fitted quite a number as early as nine days and they seemed to get along just as well as those fitted in fourteen days. We operate most all now with twilight sleep and local anæsthetic. We use a pneumatic tourniquet and seldom lose ten drops of blood.

By way of preventive surgery, I would advise the removal of the sesamoids as soon as the child commences to develop bunions, and I have seen them as young as five years with well-marked signs, and I would not hesitate to recommend the operation even at that age, for I know they would be spared the deformity as well as the suffering incident to the development of such deformity later on.

THE PATHOLOGICAL ASPECTS OF ANAL AND OF RECTAL NEOPLASIA

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ETIOLOGY AND INCIDENCE

CANCER seems to prefer the beginning and the end of the alimentary tract Exclusive of the stomach and oral cavity, approximately 60 per cent of the remaining intestinal cancers are indigenous to the rectum The rectum occupies fifth place in the statistics, covering the incidence of the sites of primary carcinoma in the body, 4 to 6 per cent. of all malignant epithelial tumors occur in this location.

In 1921 the mortality from cancer of the rectum and anus within the United States registration area was 3029, of which 1515 were males and 1514 were females This number was 3.97 per cent of all deaths from cancer within this same year

The malignant neoplasms of the rectum appear usually in middle and later life, but instances have been reported as early as twelve years The tumor of most frequent occurrence in childhood is the benign polyp By far the great majority of rectal cancers are primary in origin, but secondary rectal cancer may follow extension from uterine cancer and, to an infrequent degree, from prostatic cancer The rectal mucosa occasionally shares with the colon an unfortunate tissue predisposition to the development of multiple polyposis

The anus and rectum do not constitute merely a musculo-membranous tube serving as a terminal depot for the intestinal tract, but they compose a highly complex organ, of interesting origin, of unique and purposeful function, and possessed of several different structural units Indeed, the differences between rectal cancer and those occurring elsewhere can be attributed largely to the peculiarities of the anatomical structure and relations of the rectum For example, when the rectal cancer becomes intolerant of its local abode, it goes visiting, consequently imposing its unwelcome presence on those neighbors of unfortunate proximity, such as the prostate, bladder,

uterus, vagina, and even the sacral plexus of nerves, where it is a typical painful guest. The rectosigmoidal junction is the narrowest portion of this part of the bowel, and shares in the frequency of tumor development with other constrictions of the lumen such as are to be found at the ileocaecal junction, pylorus, cardia, and in the œsophagus posterior to the cricoid and where the gullet traverses the left bronchus. Wherever there is an abrupt change in the nature of contiguous epithelium, such transition points are more prone than normal tissue to undergo malignant degeneration, the anal canal, in common with the lip, has a mucocutaneous junction exhibiting the same tendency to lose respect for its boundaries.

The question is often asked. "What rôle does irritation play in the causation of rectal cancer?" Cancer develops so rarely in chronic ulcerative proctitis that we may exclude the latter from further consideration. The general consensus of etiological opinion is that rectal cancer may cause constipation, but on the contrary, constipation does not cause cancer, cancer is a frequent cause of hemorrhoids, whereas the hemorrhoids may antedate but never be responsible for the origin of the cancer. Zinner emphasizes somewhat needlessly the irritation induced by pressure of the rectum against the prostate.

How about the applicability of Cohnheim's theory of embryonal displacements to the explanation of the cause of rectal neoplasia? The dimpling of the external epiblast at the anal site, the formation of the proctodeum, the establishment of lumen continuity with the hindgut, present interesting phases in the embryology of the anus and rectum. With the exception of the anatomical peculiarities previously mentioned, this has no bearing on the cause of or predisposition to rectal neoplasia, unless we consider the complexity of the rectal folds as important. Pilonidal cysts and other abnormal growths of the sacrococcygeal region have no causal relationship with rectal cancer proper.

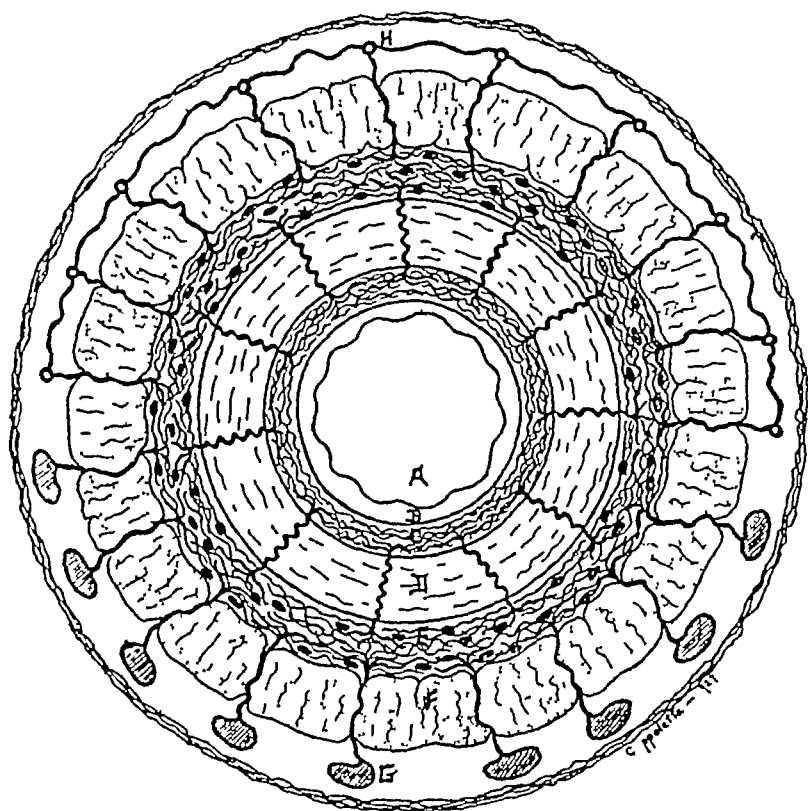
BENIGN OR INNOCENT TUMORS OF THE RECTUM

An innocent tumor is never virtuous, it may lack only the stimulus and possibly the opportunity for sinning. Its *modus operandi* resembles the action in the proverbial fable of the tolerant Arab, his warm tent and his usurping camel.

The majority of benign rectal tumors are adenomatous in

make-up The lieberkuhnian follicles are the seat of active hyperplastic processes, the characteristic cells of which are basal-nucleated high columnar cells The proliferation is more or less orderly in its regularity and does not exhibit the wild growth abandon of its

FIG 1



Schematic cross-section of the rectum to illustrate the lymphatic supply

A Rectal lumen B, Rectal mucosa C Submucous lymphatic plexus (circular) D Circular smooth muscle Note radial lymphatic vessels E Intermuscular lymphatic plexus (longitudinal) F Longitudinal smooth muscle G, Anorectal lymph-glands of Gerota H, Subserous lymphatic network.

malignant cousin, the columnar-celled carcinoma Moreover, the softness and pliability of the adenoma differentiates it from the textural firmness and basal induration of the cancer In childhood, the adenoma is frequently single and pedunculated, being attached by a long pedicle There are two factors responsible for the formation of this pedicle (1) The looseness of the submucous coat, and (2) the traction of the polypus on the mucous membrane, by peri-

stalsis and the current of feces. When the adenoma is near the mucocutaneous junction, it is broad and flat. In the adult, the adenomata are larger, sessile, more frequently multiple, and have greater inclination to acquire malignant properties.

The rectal papilloma is an adult tumor, which is either sessile or villous in its structure. The latter type, the so-called "villous tumor of the rectum," is a frequent offender of tissue neutrality. Its long villous processes wave in water like sea ferns, and have delicate, vascular stroma supporting a scarf of cylindrical epithelium.

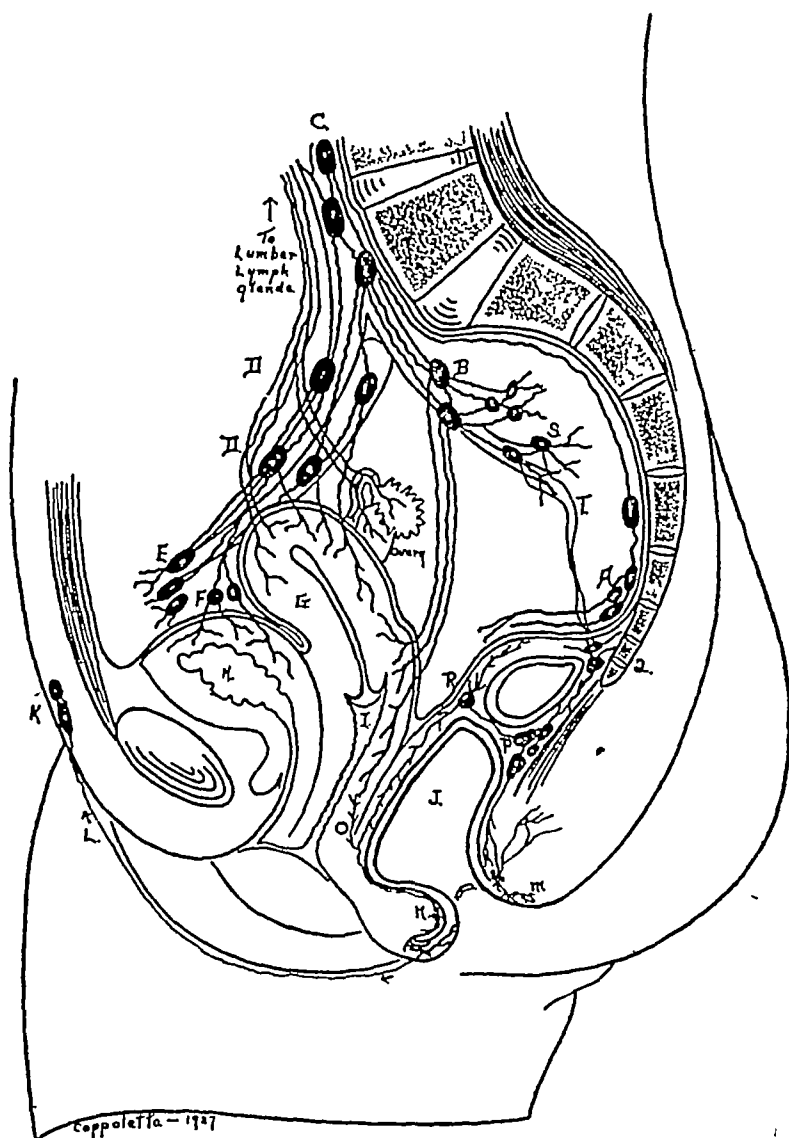
An infrequent but extremely interesting secondary tumor of the female rectum is the adenomyoma. The recent researches of Sampson have shown the true nature of this tumor, namely, that it is of endometrial origin. Although the rectovaginal septum is penetrated and the tumor appears in the rectal wall as an indurated and infiltrating growth, careful histological study reveals that the tissues invaded are not destroyed, but are only displaced. The growth propensities of this tumor, the stenosis of the rectum which it may cause, the bleeding at the menstrual period in common with endometrium elsewhere, require biopsy at times in order to distinguish it from cancer. It is benign and may be part of a generalized pelvic endometriosis, due to aberrant endometrial transplants.

The very rare fibromyoma may or may not be polypoid; it is invested with a covering of mucous membrane. The fatty appendices of the upper portion of the rectum may be the seat of lipomatosis. True fibroma of the rectum is extremely rare, most of them are probably fibrosed hemorrhoids.

MALIGNANT TUMORS OF THE RECTUM

Primary sarcoma of the rectum is rare. Ewing classifies the sarcomata in the diminishing order of their frequency, as, melanosarcoma, spindle-cell sarcoma and lymphosarcoma. All of these originate in the submucosa. The pigmented connective-tissue cells of the melanosarcoma are disseminated early by the blood-stream. Patchy pigmentation of the rectum and colon is now recognized more frequently than heretofore, and may be a precursor of or indicate a predisposition to melanosarcoma. The very uncommon lymphosarcoma seldom obstructs the rectal lumen, but, on the contrary, converts the rectum into an inelastic rigid patent tube. Although there

FIG 2.



Schematic illustration of extramural lymphatic supply of rectum

A Sacral lymph glands B, Upper hypogastric lymph-glands C, Common iliac lymph-glands D, External iliac lymph glands E, Lower external iliac lymph-glands F Lateral lymph-glands to urinary bladder G Uterus H Urinary bladder I Vagina J Rectal lumen K Medial superficial inguinal lymph-glands L, Lymphatics from peri-anal region to inguinal lymph-glands. M, Lymphatic supply to peri-anal skin. N Lymphatic supply to external sphincter muscle. O, Lymphatic anastomosis in posterior vaginal wall P Anorectal lymph-glands of Gerota. Q Retrorectal lymph-glands R Subserous lymphatic channels S Paracolic lymph-glands. T, Lymphatic channel from anorectal and retrorectal lymph-glands to paracolic lymph-glands.

are a few lymph-nodules imbedded in the mucosa of the rectum, the lymphosarcomas are usually secondary to primary sites higher up in the intestinal tract

Epithelioma or squamous-cell carcinoma of the anus is uncommon, aggregating only 3 to 4 per cent of all rectal cancers. Its site of predilection is at the mucocutaneous junction in the mid-line anteriorly. It forms a nodular, warty, flattened growth, which tends to ulcerate and involve the rectum proper. It has the potentialities of a very malignant tumor.

The remaining cancers of this region are adenocarcinomas, which are also the most frequent tumors. The symptomatology, growth tendencies and pathology of these differ according to their location in the rectal canal. The lumen of the rectum is always narrowed by the malignant growth, this stenosis is most apparent at the recto-sigmoidal junction where the tumor early encircles the bowel to form an annular stricture. Miles finds that the majority of carcinomas of the rectal ampulla begin on the posterior wall. The four common types of adenocarcinoma of this region are (1) The papillary carcinoma, (2) the malignant adenoma or adenoma destruens, (3) the gelatinous or colloid carcinoma, (4) the scirrhus or fibrocarcinoma.

The papilliferous or papillomatous carcinoma resembles the benign papilloma somewhat except for the invasive nature of its base. This tumor may be frankly malignant from its onset, or it may be a malignant degeneracy of the benign papilloma. Fortunately its growth energy is expended largely by eversion or surface proliferation, producing a bulky exuberant tumor, before the bowel wall is infiltrated.

Adenoma destruens is the most common type of cancer of the rectum. It may appear early as a cancerous plaque, later forming a malignant ulcer due to necrosis of the overlying surface. The transition between normal and cancerous mucosa may be surprisingly abrupt. This pseudonymous adenoid carcinoma sometimes forms a sessile, circumscribed growth. The tubules and their component cells may be quite similar to normal tissue in some instances, inasmuch as there is much variation in the histological character and malignancy of these tumors. Only too frequently they penetrate the muscularis mucosa, early and deeply, with the formation of solid, medullary or cord-like masses of cells or irregularly arranged acini.

within the submucosa. Secondary infection and trauma cause ulceration, which hastens the dissemination of the tumor. The malignant ulcer is crater-like, with indurated, elevated edges, occurring for the most part in the lower part of the rectum and at times encroaching on the sphincter. The ulcer may be associated with other non-ulcerating adenomata, existing higher up in the rectum and sigmoid colon.

The colloid or gelatinous carcinoma is a degenerative stage of adenocarcinoma and is extremely malignant. It forms a bulky massive growth in which gelatinous or mucoid material replaces the tumor tissue.

The scirrhous or fibrocarcinoma is a peculiar type of rectal adenocarcinoma exhibiting desmoplastic tendencies, in which the atypical and anaplastic cancer-cells are growing diffusely and are nestled among wide strands of new connective tissue. The ulcer formed is indurated due to this fibrosis, and the length as well as the diameter of the lumen is lessened by the consequent cicatricial contraction.

DIAGNOSIS

There are three examinations which are imperative in rectal cancer, namely, digital, proctoscopic and biopsical. The pathologist is no magician, and the microscope no "open sesame" in that it reveals all that is necessary concerning a tumor. Therefore the pathologist should utilize all three methods of examination, whenever possible, because he can derive considerable valuable information from such facts as the consistence, location and gross appearance of the tumor.

Frequent, repeated and indiscriminate biopsies should be condemned, inasmuch as biopsy at any time is fraught with such danger of tumor-cell dissemination as to require the utmost precaution in using it. The biopsy knife is a weapon if incorrectly used. Extreme care should be taken in the selection of the site for removing the tissue for diagnosis. For example, the infiltrating base and the papillary tip of the papilliferous carcinoma present histological pictures of different significance.

Differential Diagnosis—These conditions can be eliminated frequently by gross inspection.

(1) Hemorrhoids Thirty to 50 per cent are thought to have hemorrhoids, until the disease has had sufficient time to progress. The frequency with which internal piles suddenly develop in a cancerous rectum should arouse suspicion of every hemorrhoid.

(2) The diagnosis of anal fissure may be made in the case of an early epithelioma of the anal canal.

(3) Rectal tuberculosis is usually secondary to pulmonary lesions, the bacilli reaching the rectum either by the blood-stream or as a consequence of swallowing the sputum. The fistulous type is not so confusing in diagnosis as the ulcerative type. Tuberculous ulcers are most frequently multiple.

(4) Syphilis of the rectum is more common in the female. The ulcerative syphilitic lesion begins as fused gummata in the submucosa, becoming an open lesion when the overlying mucosa undergoes necrosis. The anorectal syphiloma resembles lymphosarcoma of the rectum. It consists of a diffuse infiltration of the submucosa to form a rigid inelastic tube.

(5) Dysenteric ulceration is multiple. The isolation and recognition of the offending bacillus or entamoeba clarifies the diagnosis.

(6) Simple ulcerative colitis.

(7) Fecal impaction has been diagnosed as cancer and *vice versa*, particularly when the lesion is at the rectosigmoidal junction.

If every physician would examine the rectum in *every* instance of hemorrhoids or rectal hemorrhage, *every* instance of persistent constipation or diarrhoea, *every* instance of rectal pain or discomfort, *every* instance of incomplete relief and sense of fulness after defecation, *every* instance of sciatica of unknown cause, then we might hope for earlier diagnoses of rectal cancer and pari passu lower mortality rates. Unfortunately the rectum is not well supplied with the nerve-endings of pain, so that a considerable growth may be present before pain, "the warning sentinel of injury," notifies the individual of his impending danger.

A SUMMARY OF ANATOMICAL FACTS, THE KNOWLEDGE OF WHICH IS ESSENTIAL FOR THE STUDY OF DISSEMINATION OF RECTAL CANCER

The rectum is five or six inches in length. The upper two-thirds of the rectum is covered by peritoneum anteriorly and laterally—and the lower third has no serous covering. The density and thickness of

the muscular and fibrous wall of the rectum and its investment by the fascia propria are influential in preventing direct extension of the tumor growth. There is a close anatomic relationship between the rectum and the other pelvic viscera, such as the uterus, vagina, broad ligament, urinary bladder and prostate gland, consequently these viscera are sometimes invaded by the spreading rectal cancer, and then again the rectum may be secondarily involved by cancer primary in one of these organs

The veins of the rectum consist of two portions, an internal and external hemorrhoidal plexus. The internal hemorrhoidal plexus is situated between the muscular and mucous coats. The external plexus rests upon the outer surface of the muscular coat and gives origin to three pairs of veins. The inferior hemorrhoidal vein joins the internal pudendal vein and thus is in direct line of flow with the inferior vena cava, the middle hemorrhoidal vein opens into the hypogastric and superior hemorrhoidal veins, the superior hemorrhoidal vein is the beginning of the inferior mesenteric vein and eventually its contents are filtered through the liver sinusoids.

The lymphatics of the rectum are not so numerous as those of the uterus, yet they are abundant enough to play the most important rôle in the spread of rectal cancer. As a general rule lymphatics are most abundant about the neck of an organ, whether it be the cervix uteri, gall-bladder, stomach or rectum. Miles has recently classified the lymphatic supply of the rectum in a most comprehensive manner, his arrangement is herein given in detail with certain additions.

(1) The intramural lymphatics in the wall of the rectum form two plexuses which communicate freely by channels which are radially arranged. (a) The submucous plexus consists of a network of lymphatics in the ampullary portion of the rectum, which communicate with lymphatics of the pelvic colon and of the anal canal. (b) The intermuscular plexus is continuous with the lymphatics of the pelvic colon and those which supply the external sphincter.

(2) The intermediary rectal lymphatics consist of a subserous network beneath the peritoneum of the upper part of the rectum and a lower communicating lymph space or cistern situated between the external muscular coat and perirectal fat in that part of the rectum not invested with peritoneum.

(3) The extramural lymphatics of the rectum spread in three directions. Inferiorly, laterally and superiorly. Over the surface of the rectum are found the so-called anorectal glands of Gerota, situated among the terminal branches of the superior hemorrhoidal vessels.

(a) Inferior efferent lymphatics. These lymphatics supply the perianal

skin, the external sphincter muscle and the ischiorectal fat. The anal integument has an abundant lymphatic network, from which three to five vessels on either side pass to the inguinal region and end in the medial superficial inguinal nodes. Some of the lymph-vessels from the anus pass upwards through the fatty tissue in the ischiorectal fossa, and after penetrating the levator ani, terminate in a node near the origin of the internal pudic artery. Lymphatic vessels traverse the ischiorectal fossa with the inferior hemorrhoidal vessels and enter into relation with lymph nodes close to the exit of Alcock's canal, then they pass through the canal and drain into the internal iliac glands.

(b) Lateral efferent lymphatics. Some of the lymph glands drain lymphatics from the middle zone of the rectum. The lateral lymphatics extend outward between the levator ani muscles and the pelvic fascia. The peritoneum is in close relationship with the lymphatics of the pelvic fascia. Some vessels from the pelvic fascia drain into the obturator glands at the obturator foramen, from which other efferents leave to drain into the internal iliac glands. Anastomoses occur with the lymph vessels of the uterus, vagina, bladder, broad ligament, or prostate.

(c) Superior efferent lymphatics. This is the most important zone for the spread of cancer. These lymphatics accompany the superior hemorrhoidal veins and enter the lowermost mesocolic glands (retrorectal). They accompany the inferior mesenteric vein to empty into a group of glands near the bifurcation of the left common iliac artery and also into the aortic glands (median lumbar). The paracolic glands situated along the mesenteric border of the pelvic mesocolon are in series with the anorectal glands previously mentioned.

THE DISSEMINATION OF CANCER OF THE ANORECTAL CANAL

There are three ways in which cancer of the anorectal region is disseminated, *viz*, direct extension or by continuity, lymph spread by permeation of the lymphatics or lymphatic embolism and metastases by the blood vascular system. *Direct extension is the first process to be initiated.* Lymphatic spread is next in time and frequency and is of the most surgical importance, metastasis *via* the blood-stream is the least common route, but is inevitably lethal in its effect.

Local extension is the result of the infiltrative, invasive tendencies of an expansive, centrifugally growing tumor. This converts a movable cancer nodule in the mucous coat into a fixed growth, inseparably fused with the muscular layer. Although the advancement is in all directions, the most rapid spread is transversely, particularly at the rectosigmoidal junction. Miles is responsible for the statement that an average of a year is consumed by a growth encompassing three-quarters of the bowel circumference, and that by the time half

of the circumference is involved, the cancer will no longer be movable. The microscopic growing edge burrows freely under the mucous membrane. The resistance of any tissue to invasion by growth continuity is directly proportional to the density of the tissue concerned, hence the muscles and fascia propria of the rectum offer barriers which delay the progress of dissemination. Approximately a year after the onset of symptoms and the beginning of its impeded local advance, the fascia propria is penetrated and neighboring structures invaded. The involvement of the sacral plexus causes an intractable, tormenting pain. The viscera directly invaded may be the prostatic sheath, the seminal vesicles, the base of the urinary bladder, the posterior wall of the vagina and the cervix uteri. The serous covering of the upper part of the rectum sometimes exhibits multiple tubercle-like cancer nodules, which may implant tumor-cells by contiguity on the peritoneal surface of intestinal loops. Accompanying the peritoneal nodosity is an occasional coexisting ascites. Secondary ovarian tumors may develop, which resemble closely the Krukenberg tumor.

The lymph spread of cancer may follow any of the lymphatic pathways previously described. The lymph-glands forming catchment basins for the anorectal lymphatics are the earliest involved, because the cancerous emboli follow the direction of the current of lymph flow. Abundant evidence exists, in the broad ligament and elsewhere, that either retrograde embolism is a possibility or permeation of the lymph-vessels occurs. The large, palpable retrorectal lymph-glands may be enlarged because of septic absorption from an ulcerating tumor. The histological examination of such glands reveals not the slightest trace of tumor involvement, but only inflammatory hyperplasia. The submucous lymphatic plexus is composed of lymphatic vessels which encircle the bowel, whereas the intermuscular plexus runs longitudinally. It is extremely likely that this is one reason for the tendency of cancer to encircle the bowel wall, because little groups of cancer-cells can be discerned at some distance from the primary growth and later form submucous nodules around the periphery of the tumor. In cancer of the anus, both the rectal and inguinal glands may be involved as well as the external sphincter muscle, the peri-anal skin and the ischiorectal space. The lateral

lymphatic spread involves the same viscera as in direct extension, but at a much earlier date. The levator ani muscles and the peritoneum are in close relationship with the lymphatics of the pelvic fascia, and suffer accordingly for this pernicious proximity. The upward zone of spread is the most common and the most important. The entire chain of glands accompanying the superior hemorrhoidal and inferior mesenteric vessels between the folds of the pelvic mesocolon, may be the seat of metastatic deposits.

Embolic metastasis by the blood-stream occurs late in the history of the disease, but there are instances where distant metastases have occurred with a quite small primary growth. Although this is usually a late manifestation, its occasional early occurrence renders an otherwise operable tumor inoperable. When venous metastasis does occur it is usually by the portal system into the middle of the right lobe of the liver. Pulmonary metastasis by way of the inferior hemorrhoidal, internal pudendal and inferior vena cava veins is most eccentric although possible.

Medullary carcinoma infiltrates the rectal wall slowly and very seldom spreads anywhere except to the regional lymph-nodes. The scirrhus carcinoma is a stenosing growth, which encircles the bowel and at a late date may metastasize to the liver and bone. The gelatinous or colloid carcinoma is extremely malignant, implicating the entire rectal wall by its massive growth and eventually, after perforation, growing profusely in the peritoneum, lymph-glands and, in exceptional cases, the bone-marrow (Miles).

PROGNOSIS

We cannot always judge the degree of malignancy of a tumor growth by the mortality rate for which it is responsible, because such factors as inaccessibility, asymptomatic growth and the type of tissue involved may modify the end-result. Thus, the mortality rate for cancer of the rectum is very high, yet the growth propensities and intrinsic nature of cancer of this region are only those of moderate malignancy.

After an extensive statistical survey, Douglas Quick has given the following figures for life expectancy. When the surgeon first sees the patients, 30 per cent. of them are in an inoperable stage. The

immediate mortality of the remaining operable group approaches 16 per cent. in the best of hands. At the end of three years, an average of only 20 per cent. are clinically free from disease, although some few surgeons report higher percentages. Of these "survival of the fittest," some will die later of the disease.

After the appearance of symptoms, the average length of life is one and a half years. The prognosis is better if the growth occurs at the rectosigmoidal junction or in the anal canal, because the early onset of symptoms expedites the diagnosis. Of the various types of carcinomata, the colloid growths are the most lethal, and the scirrhus growths next in severity.

Death may be due to acute intestinal obstruction, peritonitis, toxæmia from absorption, diarrhœa, sepsis, insomnia or even bowel perforation, although a malignant ulcer rarely perforates.

SURGICAL EPICRISIS

In a study of gland involvement complicating cancer of the rectum, Lusk makes the statement that one-third of all radical operations are begun on cases which are really inoperable. When the cancer has broken through the restraining fascia propria of the rectum to invade contiguous structures, a certain amount of fixation may be ascertained, which of course contra-indicates operative therapy, except palliative colostomy.

The urgency of symptoms accompanying cancer of the rectosigmoidal junction and of the anal canal explains the early operability of these cases. If the pathologist were doing surgery, there are several reasons why he would perform an exploratory laparotomy in every instance where the tumor was not manifestly inoperable. (1) It determines the operability of the cancer, (2) it permits a complete examination of the tumor growth, (3) it is a prophylactic measure to protect the patient from the discomforts of a radical operation when metastases have already occurred, (4) it gives some indication of the possibilities of regression of the local tumor growth by such a local measure as radium therapy, (5) in the event of involvement of the mesocolic lymph-glands, an opportunity is afforded to do a lymphatic dissection of the pelvic mesocolon and hence arrest the dissemination of tumor-cells, and (6) if metastatic deposits have

occurred in the lateral plane of lymphatic spread, an extensive operation similar to the Wertheim for uterine cancer can be carried out

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MULTIPLE MYELOMA *

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It is with an apology that I present for discussion to-day a rare disease, for, as you know, I prefer to consider at these clinics the commoner diseases, but this patient affords an opportunity to bring before you so many matters for consideration that it seemed advisable to devote the hour to this unusual malady (History given by student)

The patient, W J E, aged forty, who was a farmer by trade, living in North Carolina, came into the hospital complaining of kidney trouble

The *family history* is essentially negative except that one uncle died of cancer of the face and one sister has goitre.

His *past history* shows that he had the usual childhood diseases Measles, mumps, whooping cough and chicken pox. He also had typhoid fever and was in bed for two weeks, at the age of twelve At the age of about fourteen, he was troubled with diarrhœa during the summer, this was characterized by gripping pains but no blood or mucus in the stools He continued well after that until about six years ago when he noticed that he began to catch cold much more frequently than usual Four years ago he had some cough, some sputum, and shortness of breath on exertion There was no blood tinged sputum or night sweats Several years ago he developed marked constipation and hemorrhoids which were removed three years ago

Present Illness—Ten years ago the patient was lifting a two hundred pound sac of fertilizer and experienced a sharp pain in the back This pain persisted for several days, then disappeared Again, seven years ago, when lifting some thing he had a similar attack of pain which remained a little longer this time and radiated slightly to the hips This pain, too, disappeared Five years ago, which is probably the beginning of the present illness, he was cutting wood and while stooping over was struck by a sharp, knife-like pain in the back that threw him to the ground It was followed by a dull ache which radiated to his hips and this pain has never entirely left him He never again tried to do any heavy lifting around the farm Four years ago, he was troubled with some dyspnœa on exertion, which was first noticed when trying to cut wood This dyspnœa and cough and some wheezing were worse in the winter, but tended to leave him in the summer An operation for hemorrhoids was performed in this hospital about three years ago In October, 1924, he passed large quantities of bloody urine This hematuria lasted four or five days and alarmed him considerably He had violent headaches, and there was fever and anasarca. The feet were swollen This condition was more or less marked for one month, but at the end of that time most of the symptoms subsided. There has always remained, however,

* Clinic held at Johns Hopkins Hospital, Baltimore, Md, November 13, 1926, reported by Miss Mary E Reik.

some slight swelling of the feet, headaches have continued, the pulse has been bounding and there has been some nocturia

In addition to this history which suggests an attack of acute nephritis, progressing to chronic nephritis, the patient gives a history indicating some disease of the bones. Following the onset of nephritis, a little over a year ago, he was carrying a log across the road when he stumbled and had a fracture of a rib on that side. That spring, between March and May, 1926, he was confined to bed with sharp pain radiating to all parts of the body, described as "lightning pains." He felt as if he was "being drawn together." The pain was very severe. When he got out of bed, which he was finally able to do in May, he went to several hospitals and on two occasions the trouble was diagnosed by X ray as cancer of the bone. He finally went to an osteopath and received some treatments. Since that time he has been walking, but with considerable difficulty. He has noticed that he is three or four inches shorter than formerly. He cannot straighten his back. There is a tendency for the knees to bend forward and he cannot straighten them without great difficulty and pain. He has noticed some change in the contour of the chest, a protrusion of the abdomen, but no change in the size of the head or face. He has had no severe pain since the onset but has had some headaches and tenderness over the spine and over one rib on the left side. He has grown paler.

On physical examination, when he first entered the hospital, there was some pallor and a yellow tinge to the complexion. The mucous membranes were pale and there was noticeable loss of weight. He also had some cough. There was slight strabismus and the conjunctivæ were slightly pale with a bluish tint. The mucous membranes of the mouth were pale. The tonsils were not enlarged. The teeth were in rather bad condition. Some enlarged glands were palpable, particularly on the left side of the neck. The thyroid was somewhat enlarged on the right side and is now palpable. The trachea is deflected a little to the right. Examination of the lungs showed at the time of admission a few musical râles audible throughout the chest. The breathing was somewhat emphysematous in character. It was thought there was a faint palpable thrill over the base. The heart was slightly enlarged to the left. The area of cardiac dulness is quite wide and seems elevated above the natural position. The dulness reaches 4 cm. to the right in the fourth interspace, 10 cm. to the left in the fourth, and about 13 cm. to the left in the fifth interspace. At the same time the cardiac impulse is most marked in the fourth space and the dulness in the second and third spaces is quite far to the right as well as to the left, so that the area of cardiac dulness is elevated to a position higher than normal, it is larger than normal and it is wider than normal. Auscultation of the heart revealed a systolic murmur at the apex and also at the base. The liver was palpable two fingers' breadth below the costal margin. The spleen was readily palpable. The abdomen protruded markedly, and had a tendency to drop forward.

DR. LONGCOPE. You may recall the patient that we saw the other day with Paget's disease, and, if so, you can see that the stature and position of this patient differs strikingly from that of the man with Paget's disease. In the first place, this man is generally shorter. His thorax in particular is shorter, which is one explanation for the abnormal position of his heart. (Figs 1 and 2.) Moreover, the distance from the iliac crest to the shoulder is much reduced below normal. The abdomen is protuberant and the chest is very thick.

Fig 1



Side and posterior views of patient with myelomata situated in various portions of the body

FIG. 2



Röntgenogram of lower spine pelvis and upper portion of the femurs showing the myelomatous deposits

Antero posteriorly he assumes a most curious posture as he stands before us. He stands with his knees bent and his body thrown in an abnormal position—I think in order to keep his balance—when one examines the back he finds the normal lumbar curve is entirely absent. There is a little dorsal curvature but the lumbar vertebræ are quite flat. He bends over with difficulty, and in doing so keeps the lumbar vertebræ fixed. If he attempts to incline to the right the lumbar vertebræ show no lateral flexion. Below the lower thoracic region there is no mobility of the spine. He can move his head to the left and right very well, and he can bend his knees and throw his head back, but he does not bend his spine. That is a point which he himself has noticed and of which he has complained. If one examines the long bones, it is quite impossible to discover anything abnormal. But over the left sixth rib, however, there is tenderness.

The liver may be enlarged, but since the relationship of the thorax to the abdomen is entirely altered in this individual, it is possible that the liver may have become displaced downwards. It is quite probable that the mass we feel in the left hypochondrium is the spleen which is also displaced downward rather than enlarged.

STUDENT The blood pressure was 170/102 on admission. There are no abnormalities in the fundi except some tendency to blurring of the discs and some thickening of the smaller arteries of the retina. The examination of the rectum shows nothing abnormal.

The blood-count showed red blood-cells, 1,800,000, hemoglobin, 40 per cent, color index high, white blood-cells, 12,000, P.M.N., 70 per cent, P.M.E., 1 per cent, P.M.B., 1 per cent, Monos, 2 per cent, Trans, 3 per cent, lymphocytes, 23 per cent. The urine on admission showed specific gravity, 1015, albumin about four plus, no sugar. Microscopic examination of the urine showed many red blood cells, some white cells and some casts. Phthalein, 55 per cent., N.P.N. 34 mg per 100 c.c. Blood-calcium, 10.8 mg per 100 c.c. $PO_4 = 4.8$ mg per 100 c.c.

DR. LONGCORE We can conclude two things, I think, from the story as far as you have given it to us. First, this man undoubtedly presents the symptoms and signs of chronic nephritis, which was preceded by an acute attack of nephritis. He is now in the stage of a moderately advanced nephritis without, however, the evidences of renal insufficiency for the blood-chemistry, including the calcium and phosphorus, is normal and the phthalein is not reduced. Secondly, he is suffering from some disease of the bones.

An examination of the röntgenograms from the patient is of importance. In the first place, the teleo-röntgenogram of the heart confirms the conclusion which we arrived at from the physical examination as to the position and size of this organ, for the cardiac shadow extends quite far to the right and far to the left, a high, broad, somewhat enlarged heart which is compatible with a chronic hypertension and chronic nephritis combined with an elevated diaphragm. In the second place, the bones of the pelvis and of the spine show a most extraordinary condition. It is almost impossible in the lumbar spine to differentiate between some of the vertebræ. The bodies are thin and rarefied. One can scarcely see the outline. They are irregular, they are distorted and they look as if they were very much thinned and flattened, while the pelvis is riddled with tiny clear areas. The same is true of the humerus and of the bones of the forearm, while the skull shows tiny holes and clear spaces throughout the cal-

varium Thus the patient has areas of rarefaction throughout the bony framework which are extensive in the spine, in the skull, in the pelvis, in the shoulders, and occur to a certain extent in the forearms To what condition may these areas of rarefaction be due?

STUDENT One of the commonest causes is metastatic carcinoma. The primary seat of carcinoma that metastasizes most frequently to bone is to be found in the adrenal, the prostate, the breast and the thyroid We might suspect in this case some growth in the genito urinary tract, such as hypernephroma or prostatic carcinoma with metastases to the bones

DR LONGCOPE There are two conditions which we should consider first in this patient. The combination of hemorrhage from the kidney and lesions in the bones is very suspicious of hypernephroma with metastases to the bone Prostatic carcinoma may exist without definite local evidence of growth in the prostate Carcinoma of the breast and thyroid can be excluded here, and there are no evidences of growth to be detected in the gastro-intestinal tract What else might one consider?

STUDENT Von Recklinghausen's disease

DR LONGCOPE Did the X-rays of the bones resemble the changes in von Recklinghausen's disease?

STUDENT I think not.

DR LONGCOPE What else can be considered?

STUDENT An osteomalacia, which is extremely rare in males, and Paget's disease

DR LONGCOPE Yes, but this man does not present the appearance of a patient suffering from Paget's disease, nor is the X ray picture that of *ostitis deformans*

STUDENT Then we should consider the infectious diseases, and particularly tuberculosis or syphilis

DR LONGCOPE I think syphilis, not tuberculosis, would be the only infection to consider seriously You recall in this connection the appearance of the bones of the girl with congenital syphilis, whom we have discussed recently with Doctor MacCallum The changes in her bones were unlike these shown in the X rays before us

STUDENT This patient's Wassermann reaction cannot be determined for the serum is anti complementary

DR LONGCOPE And it is usually in congenital syphilis that one sees these multiple lesions in the bones Another rare disease, which comes to mind is the multiple endoetheliomata of bone to which Doctor Ewing has called attention One might think further of localized tumors of the bones, but the X ray of the bones rules out such a consideration Finally one has to think seriously of multiple myeloma

How may one come to a definite decision as to whether or not this is a multiple myeloma?

STUDENT I think his age and the onset of the trouble, with the history of the disease, are very important. The onset of the trouble in the spine or back and ribs is characteristic of multiple myeloma

DR LONGCOPE Yes, the spine, ribs and sternum are most often affected, although all the bones of the body may be involved The patient is over thirty five years of age, and most of the cases occur between the ages of forty and sixty

STUDENT In addition to that the X ray shows bone destruction involving the spine and ribs without new bone formation, and a point which I think is in favor of the diagnosis of multiple myeloma is the involvement of the small bones of the hand. The examination of the urine is of great importance for the Bence Jones bodies occur in about 80 per cent of cases of multiple myeloma. They do occur also in multiple metastatic carcinoma.

DR. LONGCOPE Has this man Bence-Jones bodies in his urine?

STUDENT He has.

DR. LONGCOPE And in spite of the fact that he has large quantities of serum albumin and some serum globulin in the urine, it has been possible to detect a precipitate in the urine by proper methods which is neither serum albumin nor serum globulin, but the substance known as Bence-Jones protein. This body has certain peculiar chemical reactions which we will discuss a little later. This patient excretes only small quantities of Bence Jones bodies in his urine.

Finally, we were desirous of making an absolutely correct diagnosis and asked Doctor Lewis to see the patient with the idea of removing a small piece of bone. Doctor Lewis is concluded to excise a small portion of the great trochanter. A histological section of this bone shows the picture of multiple myeloma of plasma cell type. We can, therefore, be quite certain that the patient is suffering from this rare disease of the bones, which in this particular instance is associated with an advancing chronic nephritis. The association is interesting.

There are three names constantly quoted in articles on multiple myeloma. Do you recall them?

STUDENT Bence-Jones is one.

DR. LONGCOPE Bence-Jones in 1848 first described the body in the urine which now bears his name. Then von Rustizky, in 1873, termed these multiple tumors of the bone associated with the presence of Bence-Jones bodies in the urine "multiple myelomata." The third name is that of Kahler, who in 1884 gave an excellent description of the disease. You will find very little concerning multiple myeloma in text books, yet there is a very large literature in journals concerning the disease.

The history of this patient whom we have seen illustrates very well the course of the disease. It occurs in individuals between the ages of forty and sixty, more often in males than females, is associated with tumors of the bones without deformity of the bones, with pain and a tendency to spontaneous fracture. It lasts from eight months to eight, ten or even eleven years, is associated with a progressive anemia and in most instances is accompanied by the excretion of Bence-Jones bodies in the urine and at times by the presence of this same protein in the blood. In a fair proportion of cases there is a nephritis, and in some instances there is an amyloid degeneration of the spleen, liver and kidneys. A very curious phenomenon has been found in some cases, namely, calcification in the liver and spleen and in the vessels of the heart, which may be extensive.

What is the nature of these tumors in the bone? They are multiple, they arise from bone marrow cells, but no one has determined exactly from what cell they originate. There are long classifications with elaborate names for these tumors. It is quite obvious that they do arise from the embryonic cells or from the very young cells of the marrow, and when the cells resemble myeloblasts the tumors are called myeloblastoma, when they resemble myelocytes

they are called myelocytomata, when they resemble erythroblasts, they are called erythromata, and when they resemble lymphocytes, the tumors are called lymphocytomata, and when they resemble plasma-cells, the tumors are called plasma cytomata. I do not know whether this particular tumor has been differentiated

STUDENT It is of the plasma cell variety

DR. LONGCOPE Mr —, will you present to us the results of your summary of the nine cases of myeloma that have occurred here in the Johns Hopkins Hospital?

STUDENT Only nine cases were available in which one can obtain the complete data, including autopsy, X-ray findings and complete histories. In all these cases the age incidence is over thirty five, four males were affected to one female. The initial symptom was generally pain in the back, this being true in seven cases, whereas in two cases it was in the shoulder or near the shoulder. The past history of all the cases showed malaria or typhoid or both. The history of pathological fracture occurred in eight out of the nine cases, and in the ninth case a fractured bone was discovered accidentally. In all the cases the ribs or the spine were involved. In some the clavicles, sternum and skull were likewise affected. Frequently there were changes at the costosternal junction and by palpation one could generally elicit tenderness. In all the cases there was marked loss of weight and weakness and in most cases anemia. The Bence Jones protein was found in the urine in five out of eight cases and all the cases had either pyelitis or nephritis.

DR. LONGCOPE Pyelitis and nephritis are only occasionally mentioned in the literature as accompaniments of multiple myeloma. Jacobson calls attention to the fact that nephritis may complicate these cases of multiple myeloma, but no one, I think, has brought out such a high incidence of nephritis in multiple myeloma as occurs in these nine cases.

The final point which I should like to discuss is the chemistry of the Bence-Jones body. It is a very curious protein substance. In the first place it is excreted with great readiness through the normal kidney, for when it is injected into the dog, unlike some other foreign proteins, it is readily eliminated through the kidney. In the second place it is crystallizable, and can be obtained in pure crystalline form. Thirdly, it is a protein that is quite different from the proteins of the blood stream. This fact can be demonstrated by its chemical and biological reactions. Doctor Bayne-Jones has shown by anaphylactic reactions that this crystalline body is biologically as different from serum albumin and serum globulin as is egg white or any other foreign protein. In the fourth place, it has been considered by many as a degradation product of a larger protein molecule, or as a substance resembling albumose. It is interesting to note that a protein of this nature should form antibodies because, as you know, it is only the proteins of large molecular form that are able to call forth antibodies. You perhaps know Hopkins and Savery's article on the chemistry of Bence-Jones protein. This is one of the best articles that has been written on the subject. They have studied the chemical reaction of the protein from several cases of multiple myeloma. One of the characteristics of this protein is that it is precipitated at a comparatively low temperature, 45-55° C, that it is also precipitated in the cold by a strong mineral acid, and that when the precipitate is boiled in acid it redissolves.

Not only is Bence-Jones protein present in the urine of cases of multiple myeloma, but it may also be found in the blood serum. This discovery was first made when blood serum from a case of multiple myeloma was sent to a laboratory for a Wassermann reaction. When the serum was heated to 55° C in order to inactivate it, the serum became curdled, and it was found on further study that the precipitate which occurred at that temperature was composed of Bence-Jones bodies. It has been suggested by Hopkins and others that one method for detecting Bence-Jones bodies in the presence of serum albumin and serum globulin might be to heat the urine or the serum to 50° C, at which temperature the albumin and globulin do not precipitate, but at which temperature, as you can see, the Bence Jones body does coagulate.

A priori one might have thought that in this patient the chronic nephritis might interfere with the excretion of Bence Jones protein and that large quantities of the protein might be found in the serum. Doctor Perlzweig has not been able as yet to detect Bence Jones protein in the serum of this case.

In conclusion, therefore, it is evident that the patient presented to day represents a typical example of multiple myeloma, probably of the plasma-cell variety which is associated with a progressive chronic nephritis. The myelomata have affected many bones, including the vertebræ, the pelvis, and the skull. In this instance the excretion of large quantities of albumin and globulin in the urine might readily mask the presence of small amounts of Bence Jones protein and it is only by especial methods that this body can be found in the urine of the case under consideration.

Medicine

SUDDEN ATTACKS OF GASPING AND FEAR OF DEATH IN A BOY OF FOURTEEN, FAULTY PHYSICAL AND MENTAL HYGIENE, DISCUSSION OF DIAGNOSIS AND TREATMENT OF THE PSYCHASTHENIC STATE AND OF THE SCHIZOTHYMIC PERSONALITY *

By LEWELLYS F BARKER, M D

Baltimore, Maryland

IN THE *Forum* for October, 1926, is an article by Mr Herbert Hoover, entitled "The Search for the Perfect Child" Responsible for the care of many millions of starved, stunted, poorly clad waifs in Europe during the war and afterwards, Mr Hoover and his associates provided food, clothes and coal, battling up from the obviously subnormal towards the normal child These workers got the impression that the young human being is a hardy animal with a predilection toward normality, if given a chance They were astonished to see the changes in the great masses of children from pitiable, silent, indolent, woe-begone creatures into playing, chattering, joyous, mischievous, human dynamos They were grateful that the twenty million children in America lived in a country in which there was but little poverty, in one that was free from war, contagion and famine But their illusions about American childhood were shocked by the draft figures of 1920, in which it was reported that 80 per cent of men of draft age had been physically below normal, and that one-third of these men had not even been able to meet the requirements of a country desperate to raise men for war Mr Hoover asks how can this be accounted for in a country that has a good climate, one in which an abundance of food is available, in which there is little poverty, and in which there is great devotion to children? Summarizing the reasons offered by technical experts, he concludes that it is due to ignorance, to failure to disseminate available knowledge and to failure to establish adequate standards of judgment by which mothers can know what to look for and what to build towards Mr Hoover makes an appeal to medical men and

* Thursday Clinic for physicians at the University of Maryland, December 10, 1926 Revised from stenographic notes made by Miss Mary E Reik.

scientists to set up intelligible standards, first, as to what is to be regarded as normal for the child of the present, and, secondly, as to how present normality can be improved upon for the coming century. He wants to know with a certain definiteness to what degree of health, given a sound inheritance and a wholesome environment, a child may reasonably expect to attain.

Mr Hoover probably realizes, better than most laymen, the magnitude of the task he has set, but I doubt if even he has fully realized the stupendous difficulties in the way. In the first place, "normality" and "perfection" are pure abstractions. There are many "normalities" and there can be no "perfection", but it is none-the-less desirable that information should be gained as rapidly as possible regarding the extent of variation for each trait that can be considered to be within "normal" limits and that we picture to ourselves certain ideal types toward which the race may struggle. What Mr Hoover really wants would seem to be not so much an "average" child or any impossible "perfect" child, but rather children whom we, as medical men, would speak of as being "capable of adequate biological responsivity". That is to say, the attempt should be made to secure children born with genotypic patterns that on reaction with environments that are not too inimical to them will make adequate adjustments and will develop personalities of harmoniously balanced functions. To meet Mr Hoover's requirements, there must be developed first a theory and practice of *eugenics* and then a theory and practice of *euthenics*, for only through a combination of good heredity and favorable environment, an ever better heredity and an ever better environment, is a progressive "normality" of children and an approach to "perfect" childhood conceivable.

The patient before you to-day, a boy of fourteen, is far from being "normal," either physically or mentally. After making clear to you some of the deviations from the normal in this boy, I shall point out some of the determinants of his abnormalities. I shall give you the reasons for my belief that he was born with a genotypic pattern that was prophetic of neuropathic tendency, and I shall show you also that his environment (physical, psychical and social) has been such that, even had he been born with a good genotypic pattern, his capacities for biological response would necessarily have suffered limitations because of a very inimical environment.

THE CASE HISTORY

The patient, O E, a white schoolboy of fourteen, was admitted to Ward G of the medical service of the University Hospital (Professor Pincosffs) on November 19, 1926, complaining of extreme nervousness which has kept him from school during the past two years, spells of suffocation, weakness and trembling (especially at night), weeping spells, headaches and poor appetite

Family History—His father (age forty-one) is living but suffers from bronchial asthma His mother (age thirty nine) is living and said to be healthy An older brother died in infancy He has one brother living and well (age two), and one sister living and well (age six) The paternal grandmother was a very nervous woman, and one paternal cousin was treated recently for marked psychoneurotic symptoms

The mother describes the father as a man of poor health, "he is inclined to worry and to be easily disturbed" He works as an oysterman on the Chesapeake Bay The maternal grandfather had high blood pressure and in later life (eleven years before he died) became selfish, jealous and apprehensive

Past History—The boy was born August 6, 1912, following a full term pregnancy without complications The labor was a natural one, easy, lasting only about five hours His early development is said to have been normal He was breast fed, having weighed nine pounds at birth, he gained weight progressively He sat up when six weeks old and he walked at sixteen months There were no paralyses, convulsions nor skin eruptions in early childhood He had whooping cough at four years When he had measles (at seven), he was delirious and seemed toxic, staying in bed a few days, but he recovered completely He has been vaccinated twice Some eight years ago he fractured his right arm He has never been operated upon

He entered school in his sixth year and continued at school for six years, but stopped two years ago in the sixth grade on the advice of physicians, although he had done very well in school up to that time. He is said to have been a good boy, and to have been fond of playing with others until his illness began, since when he has stayed about the house most of the time, has had but little energy and has been easily frightened He has, as a matter of fact, been a timid boy throughout life It is said that he has usually had better health in the summer than in the winter

Present Illness—About two years ago, in the autumn, he first noticed that he became easily short of breath He would take long breaths because he "felt he was choking" When his mother asked him what was wrong, he said that "nothing was wrong" One night, just as he was about to fall asleep, he awoke with a start, gasping, and felt as if he were losing his breath. Then he became nervous, "shook all over" and had the feeling that he might lose his breath entirely, that each breath might be his last. He called his mother and told her his fears He had a nervous chill and felt cold all over He also states that he saw "dazzling lights" Since then he has had similar attacks at irregular intervals The attacks usually come on at night, though they never awaken him from a deep sleep, during the day he has seemed to be, his mother states, free from attacks Sometimes he has felt his heart beating rapidly During the past few months he has become weaker, has been restless and very emotional, at times he cries and says that he feels that he is going to die because he will lose his breath.

The boy was taken from school because the teacher's pounding on the desk troubled his nerves and upset him¹

Since the first attack, the boy has been afraid to sleep alone and has occupied the same bed with either his father or his mother. There is no gasping of breath, no restlessness and no complaint of seeing lights when he is allowed to sleep with either parent. Between attacks, he has been restless and "fidgety," and is often seen taking deep breaths.

The attacks have not been accompanied by convulsions, by loss of consciousness or by paralysis, nor has there been any associated disturbance of the functions of the rectum or of the bladder. The last attack occurred in September, on the night of the Dempsey Tunney fight. He had heard the fight reported over a radio at a nearby store, and had been much disturbed by the noise and especially by the loud talking of the ring enthusiasts. He returned home gasping for breath, trembling and feeling weak in the knees. The boy says that, before this, the least excitement, the fear of sleeping alone, the fear of travelling by water, and the fear of meeting people at church would make him nervous and afraid, and that then these attacks of suffocation would appear. The mother of the boy states that the attacks have been worse this past autumn than at any previous time.

His appetite has been poor for some time, but there has been no complaint of abdominal pain, constipation, nausea or vomiting. The boy's weight is said to have remained stationary during the past two years. Though his eyesight has been good, he states that prolonged reading causes "burning and blurring of the eyes," and he occasionally suffers from headaches.

Physical Examination—He is 5 feet 1½ inches tall and weighs 80½ pounds. Rather poor muscular development. Face has the expression of happiness and contentment rather than of sickness or distress. The chest is narrow and long. There is no pubic hair. His temperature has been normal except for a slight elevation to 99° or 100° at intervals of several days. His pulse rate is usually between 80 and 90, though on admission it was 100. His ordinary respiratory rate is 24.

He looks undernourished. The tongue is slightly coated. The teeth are carious. The tonsils are enlarged and show large crypts containing plugs. The retrocervical lymph glands are palpable. The blood pressure has varied between 100 and 115 systolic, 70 diastolic. The heart and lungs show no abnormality. Abdominal examination is negative. The testicles are small. There is phimosis with redundancy of the prepuce. The thyroid gland is not enlarged and there are no signs of hyperthyroidism or of hypothyroidism.

There are no objective disturbances of sensation. Muscle power and muscle tone are normal. The gait is not disturbed. The speech is clear. No hyperkineses observed here. The deep and superficial reflexes are normal. Coordination tests yield normal response. Romberg is negative. Cerebral nerves negative. There is vasomotor instability, with cyanosis of the lips and moist, cold hands and feet.

Nose and Throat Report—"Infected tonsils and adenoids and suspect sinuses."

Dental Report (Doctor Wintrup)—"Three infected teeth (upper and

¹Persons thus easily disturbed by sounds are described as sufferers from "phonophobia."

lower right first molars, upper left first molar) to be extracted and the sockets curetted Cavities to fill, prophylactic treatment of the gums indicated "

X-ray Examinations (Dr H K. Walton)—"Sinuses, clouding of the left antrum, possibly polyp formation in the left antral cavity Chest Bronchitis Teeth Carious crown and apical abscess in the lower right first molar Carious crown and apical absorption of the upper right first molar Incompletely erupted third molar "

Laboratory Tests—"Blood examination R.B.C, 4,336,000, hemoglobin, 80 per cent, W.B.C, 6400, P.M.N., 76 per cent, S.M., 22 per cent., L.M., 2 per cent The urine was normal The phthalein output was 70 per cent in two hours Blood Wassermann negative, spinal fluid Wassermann also negative "

Mental State—On account of the peculiarity of the attacks, Doctor Rockwood recorded his impression upon some of the general mental characteristics of the patient To him, he seemed to be an introspective boy though he was extrospective to a certain extent He was seclusive at home rather than extro-active and was egotistic at home rather than sympathetic. He tends to play with younger children or by himself He does enjoy games such as dodge ball He goes fishing and plays checkers He is not a leader among the boys There seems to have been no day-dreaming but he has occasional night mares. He is afraid in the dark The main bodily complaints have been shortness of breath, choking sensations, nervousness, chilliness and palpitation He got along well at school up to the sixth grade He seems to have got on well with other boys They did not tease him Asked as to his attitude toward his family he said that he liked his father best because he hunted with him However, he usually sleeps with his mother and refuses to sleep alone or without a light in the room He likes his two year old brother better than his six year old sister It is to be noted, however, that his illness occurred at the time this young brother was born

Binet Simon Test (Dr L F Woolley)—The chronological age is fourteen years and three months The mental age by the Binet-Simon test is ten years and six months, giving an intelligence quotient of seventy three

The sensorium is not disturbed The patient gives a history of anxiety attacks coming on at night or in relation to excitement, especially when he is frightened He has suffered from these for two years, during which time he has not gone to school He has always slept in the same room with his parents For the first eight years of his life he was the only child, as his older brother died in infancy There has been no history of strain or stress at school His voice has not changed

There seems to be a wealth of potentially psychogenic material here without any apparent association with the present illness though the patient requires more exhaustive psychiatric study

Since the mental age appears to be somewhat less than the chronological age, the patient is a "border line case" or "dull normal" The attacks may be hysterical equivalents in a retarded child.

Suggestions (1) that the boy be given employment and be removed completely from school

(2) That he have his own room and sleep by himself at home

(3) That he be enlightened as to possible sex worries, since his mother says that he has had no authoritative source of sex information

(4) That he be not subjected to deep psychotherapy but rather treated by suggestion and by the correction of physical defects as far as possible

Later Psychiatric Examination and Intelligence Rating (Doctor de Berry) —In this test, the Stanford revision of the Binet Simon test was used. The boy completed all the tests for the fourteenth year, having difficulty with only the one dealing with arithmetical reasoning. In the test for the seventeenth year (average adult) he failed in all but the interpretation of fables and the comprehension of physical relations. He showed a definite fatigue toward the end of the interview although his attention was good even at that time. He was eager to excuse his mistakes on the ground that he had been out of school for two years on account of illness.

He described his illness as nervousness, which began two years ago at about the time of the birth of his younger brother. The "nervousness" consists of sudden attacks of fear, usually occurring at bed time and accompanied by a feeling of suffocation and a peculiar sensation in his hands. In describing these things, the boy uses words and phrases that he has heard used by adults and physicians who have discussed his illness before him.

It is impossible to form a definite opinion in one short interview and without a full psychiatric history, but from the boy's own story the following facts were elicited, they may or may not be etiologically important.

He has always slept in the room with his parents, and whenever one or the other was away, he has slept in the bed with the remaining one. He is afraid of the dark and cannot sleep unless there be a light in the room. He prefers the company of his parents to that of children, and he has had but few boy friends. His illness began at the time of the birth of his younger brother—either shortly before or shortly after that event. His nervousness has made him the centre of concern in the family and has prevented his leaving his mother to attend school. Impression Normal intelligence Well developed neurotic reaction of the anxiety type.

Environmental Conditions—The patient was born on — Island, which lies about ten miles from the mainland, and is about three miles long by one and a half broad. Much of this island is marsh land and large swampy areas lie adjacent to it. There is very little woodland on the island. The soil is clay, the water brackish. The boy estimates that there are about one thousand people living on the island in three loosely built settlements. The houses are of wood and each has its own garden plot. There are no farms. There are a few narrow shell roads and about thirty automobiles on the island. The houses are heated by stoves, the wood being brought over in boats from the mainland, some coal is imported. There is no connection by wire with the mainland, and though for a time there were a few telephones, the poles have been blown down and have not been replaced. A number of people own radio sets. There are no movies on the island because "the older people disapprove of movies." There are three churches, all of a single evangelical variety. The boy says he knows of no one on the island who is not connected with this denomination except one Catholic woman "who lives off in one corner." There are also three schools on the island, having from twenty five to fifty pupils each. At times there is no doctor on the island, but for the last three years a doctor has lived there. He is a little over sixty five years of age, the boy thinks, and, according to reports, he is addicted to drink.

The population of the island is said to be almost entirely Anglo Saxon. There have been very few newcomers in recent years. The boy says that the only "new people" that he knows of on the island are those of a family that moved there ten years ago. The only occupations followed are fishing, crabbing, oyster-dredging, duck hunting, and trapping in the marshes for muskrats, mink and otter. The chief amusements of the island appear to be some out-door games for the children and younger people, and, occasionally, dances. Each August there is a big camp meeting, which most of the families attend, living in tents for a week.

The life of the boy's own family is fairly typical of family life in general on the island. His father spends most of the summer fishing and crabbing, living at home during this time. When winter sets in, he is off on the oyster boats and is often away for several weeks at a time. During some winters he also does some trapping. His mother cares for the home and also for the garden and some twenty chickens. The dwelling is a two story farmhouse, heated by stoves. It has a large cistern for catching rain water, which is used for drinking and for all other purposes.

The boy rises at eight in the morning, and, before his illness, he attended school from nine to twelve and from one to four. He helps about the house, cutting wood, carrying water and running errands to the store. For breakfast, he eats very little, usually only cornflakes with milk and sugar, rarely any fruit. In the middle of the day, he eats cabbage or some other green vegetable, potatoes, bread and butter and occasionally milk. For supper, there is usually some meat or fish (the meat generally being scrapple or sausage), potatoes, bread and butter and occasionally a piece of pie or cake. There has been very little milk recently as the family cow has been sold.

Therapy in the University Hospital—The treatment has consisted of (1) removal of physical defects, and (2) dietetic hygienic régime, including reassurance.

The tonsils and adenoids have been removed, the infected teeth have been extracted and the left antrum has been opened and irrigated. Circumcision has been performed.

Doctor Gill has made the following notes. November 24th "At this writing the boy has composed himself and is enjoying his stay. He complains of no gasping breathing, nor of any other form of discomfort. He eats well and sleeps undisturbed at night, he occupies himself with reading and talking. He feels certain of himself as far as the ordeal of having his tonsils removed is concerned."

December 1st "Tonsils and adenoids have been removed and the recovery was rapid and without complications. The boy continues to eat and sleep well. He entertains himself by playing checkers and by reading the newspapers. He looks forward to having all of his defects cleared up and to returning home well."

December 8th "The patient looks perfectly well and says he feels well. He has had none of his attacks recently, is bright and cheerful and desires to go home."

Diagnosis—(1) Psychoneurotic state (with anxiety attacks) upon a con-

stitutional and situational basis, but because of bronchitis and of father's history, bronchial asthma is to be kept in mind despite the absence of eosinophilia.

- (2) Infected tonsils and adenoids
- (3) Infected left antrum
- (4) Oral sepsis (periapical abscesses, dental caries, gingivitis)
- (5) Phimosiis with redundant prepuce, pubertas tarda, hypoplastic gonads.
- (6) Under nutrition
- (7) Faulty physical and mental hygiene

COMMENTS ON THE DIAGNOSIS OF THE NERVOUS STATE

The medical staff seems to me to have been justified in ruling out any gross organic nervous disease. For there are no objective disturbances of sensation, no paralyses, no hyperkinetic disturbances except the shaking in the attacks, no disturbances of coordination, no abnormalities of the reflexes nor of the eye-grounds, and the cerebro-spinal fluid was negative.

The two organic processes that might have been thought of are (1) *multiple sclerosis* and (2) *epidemic encephalitis*. The former is ruled out by the negativity of the objective findings (particularly in that the abdominal reflexes are present and the abdominal muscles are strong). Epidemic encephalitis is not so easy to rule out, particularly since paroxysmal disturbances of respiration are not at all uncommon as sequels of this disease. One of my associates, Dr T P Sprunt, and I have reported the case of a patient who had earlier had encephalitis, in whom we observed paroxysmal attacks of hyperpnoea so marked and of such long duration as to produce genuine attacks of tetany. There has been in this patient no history of symptoms pointing to any acute attack of epidemic encephalitis—no drowsiness, no diplopia. Moreover, there is at present no sign pointing to involvement of the cerebral nerves and no sign of parkinsonian mask. Though one cannot positively rule out an earlier encephalitic attack, the evidence is strongly against it.

Some of those who have seen the boy here have suggested the possibility of the symptoms being related to *Sydenham's chorea*. The patient has, it is true, had infected tonsils and adenoids, but there is no history of rheumatism and there are no evidences of valvular disease of the heart. Moreover, the history of the nervous attacks from which this patient has suffered during the past two years does not seem to me to point to chorea, and, as you see, there is to-day no sign of choreatic disturbance of motility.

We should, I think, keep in mind the possibility that the attacks of "suffocation" accompanied by fear of death from "loss of breath" may have been true attacks of *bronchial asthma*. In favor of this view might be adduced, in addition to the descriptions given of the nocturnal attacks themselves, (1) the statement of the roentgenologist that the chest plates show evidences of a "bronchitis," (2) the fact that the patient has had a paranasal sinusitis and infected tonsils and adenoids, and (3) the fact that the patient's father suffers from "bronchial asthma," a disease that notoriously is prone to occur in vagotonic families, and especially in the male members of such families.

But the family is familiar with attacks of asthma in the father, and it seems to have occurred to no one that the attacks in the boy could be attacks of asthma. One would like, of course, to observe one of the attacks one's self before ruling out bronchial asthma. Since there is no eosinophilia, it would seem probable that we have to deal with *anxiety attacks in a psychoneurotic patient* rather than with actual asthma. As you know, however, the psychoneurotic states are customarily subdivided into several subgroups—hysteria, neurasthenia, psychasthenia, the anxiety neurosis, etc. We must try to fix the nosological position somewhat more precisely within the large group of psychoneurotic states. Are these attacks truly *hysterical* in nature? That possibility should, of course, be kept in mind, but the absence of any objective disturbance of sensation (particularly of analgesias) and the association of the attacks with phobias and with the peculiar type of personality presented by the patient, seem to me to militate against the diagnosis of hysteria.²

Nor does the aggregate of symptoms make the case fall within the domain of *neurasthenia* as ordinarily understood. For paroxysms of the type manifested by this patient are not common in neurasthenia, moreover, fatigability, though noticeable, has not been a pronounced symptom.

Anxiety, as the dominant symptom in an attack in which he fears he may die from suffocation, certainly makes one think of the *anxiety*

² Cf. Kretschmer, E., "Hysteria," New York, 1926, Nerv. and Ment. Dis. Pub. Co., 120 pp.

neurosis described by Freud³ As you will recall, Freud (and the followers of Freud) regards "anxiety neurosis in the narrower sense" as of sexual origin As yet, this patient has not been fully studied with regard to auto-erotic practices or to other features of the sexual libido There are, it is true, certain suggestive points in this connection In the first place, the disease has manifested itself in a pronounced way at a critical period in the boy's life, that is to say, at the transition between childhood and adolescence, at the age of puberty Puberty has been slightly delayed in this patient, the voice has not yet undergone the pubertal change nor have the secondary sex characters (hirci, crines, and beard) developed, moreover, since the testes are rather small, there may be a eunuchoid element associated with this *pubertas tarda* Another point of interest in this connection is the over-attachment to the parents—the failure of the "weaning process" that should have been going on This boy still has to sleep in a room with his parents and when one parent is away he sleeps with the one who remains at home, though he is fourteen years of age! This parent-fixation should be further studied It might be well also cautiously to investigate the possibility of the persistence of a homo-erotic trend, there are certain points in the history that would certainly be pounced upon by a freudian psycho-analyst! As a child passes into adolescence it is necessary that he should achieve, in the first place, gradual independence of his parents and, in the second place, heterosexuality Failure of either achievement makes for neurosis

But anxiety attacks occur in another group of psychoneurotic states, namely, the so-called psychasthenic states⁴ And there are many features in the present instance which make one think of the *psychasthenic trend* In the first place, the boy has always been timid, has shown a certain tendency to seclusion, has preferred the company of his parents and of children younger than himself rather than children of his own age—all symptoms suggestive of a psychasthenic tendency, of feelings of insufficiency, or if you like, of an inferiority complex in the sense of Adler It is especially interesting

³ Cf Hirschmann, E, "Freud's Theories of the Neuroses," New York, Nerv and Ment. Dis Pub Co

⁴ Cf Janet, P, "Les obsessions et la psychasthénie," Paris, 1903, F Alcan, 764 pp, 8°

that the onset of the malady was coincident not only with the critical period in the boy's life (transition from childhood to adolescence), but also with the appearance of a younger boy in the family. Neuroses in childhood not infrequently occur at such a time, particularly if the older child has a feeling that his own place of interest and prestige in the family is likely to suffer from the arrival of the newcomer. Still another point in favor of a psychasthenic trend is the association of the anxiety neurosis with definite phobias. This boy has been afraid of the dark. He will not even sleep in a room unless there is a light in it. Moreover, he gives as his reason for leaving school, the fact that he felt that the teacher's pounding on the desk frightened him and made him nervous. It must be remembered, too, that the sickness which kept him away from school had its compensating feature in the fact that it permitted him to be more with his parents to whom he was preternaturally attached. Finally, the occurrence of the anxiety attacks just as he was passing off into sleep at night is suggestive, particularly the fact that he reports seeing lights at such times, a report that makes one think of the possibility of his having experienced hallucinations. However, sights and sounds occurring at the transition from the waking state to the sleeping state are not at all uncommon in nervous people, and they are usually described as "pseudo-hallucinations" or as "hypnagogic hallucinations." Such hypnagogic hallucinations are particularly common in psychasthenic persons.

Both the physical make-up and the personality make-up of this patient suggest the *predominance of schizoid elements over cycloid elements* in his personality, he is "schizothymic" rather than "syntone" or "cyclothymic" in his emotional reactions.⁵ On this account it is exceedingly important that, at the present juncture, every effort be made to improve the general health of this patient. No element of physical hygiene and no element of mental and social hygiene that can be helpful to this patient should be neglected. For, if a patient of this type should, later on, develop a definite psychosis, it is more

⁵ Cf. Wertheimer, F. I., and Hesketh, F. E., "The Significance of the Physical Constitution in Mental Disease," Baltimore, 1926, Williams and Wilkins Co., 76 pp. Also Kretschmer, E., "Physique and Character," Eng. Transl., New York, 1925.

likely to be of the schizophrenic type, which is malign in nature, rather than of the cyclothymic type, which is more benign

COMMENTS UPON THE ETIOLOGY AND THE PATHOGENESIS

Though the data, thus far accumulated, are not nearly so comprehensive and complete as we should desire, still a casual survey of the facts available would make it seem clear that the malady presented by this patient has had its origin partly in a faulty genotypic pattern (heredity) and partly in faulty physical, mental and social hygiene (environment) With respect to the boy's heredity, you will recall that his father suffers from bronchial asthma, has always been in poor health, inclined to worry and is easily disturbed The father's mother is also of a worrying disposition Furthermore, the mother's father, some eleven years before he died, developed arterial hypertension, became selfish, jealous and apprehensive There is thus the possibility of neuropathic inheritance both through the father and through the mother, which makes it probable that this boy's genotypic pattern was such as to predispose him to neuropathy or psychopathy

With respect to the possible influence of environmental factors in the development of his malady, you will also recall several facts of interest. There is nothing striking, however, as regards the prenatal history or the occurrences at birth The familial and social situation in which the boy developed, however, left much to be desired In the first place, he was an only child for the first eight years of his life, for an older brother had died in infancy and the child next in age to him (his sister) was not born until he was eight years old It is always dangerous to be an only child for too long a period, for as every one knows, parents are prone to lavish too much affection upon an only child and to be negligent in the habit training and in the discipline that is so important in the early years of life Moreover, children who are unfamiliar with the "give and take" characteristic of family groups in which there are several children not too widely separated in their ages, miss much that is good for them in the curbing of egoistic tendencies on the one hand and in the development of altruistic tendencies on the other

From the standpoint of physical hygiene, there are various defects that deserve emphasis In the first place, the diet of this

patient has obviously been unfavorable to his development. Not only has it been deficient in total calories, for he is much undernourished, but what may be fully as important, if not more important, the diet has not been well-balanced or sufficiently varied. The amount of milk the boy has had in his diet has been utterly insufficient.

Again, the boy has not had proper dental care. His teeth have been allowed to become carious. Indeed, periapical abscesses have developed about three of them, which have had to be removed since he entered this hospital. Moreover, he seems to have had no instruction in the importance of a regular dental toilette. Where diet and oral prophylaxis have been so neglected, one can feel very sure that habit training on the physical side in general has received but little attention.

From the standpoint of mental hygiene also you have heard of several serious derelictions that have been recorded. Though as far as the intelligence tests are concerned, the boy is normal or certainly not much below normal and though he got on well at school, he has been out of school for at least two years because of a nervous invalidism that has not before been studied for its origin or subjected to any rational treatment. But it has been on the side of character training (education of the emotions and of the will) that greater negligence has been manifest. The tendencies to timidity, to seclusion, to phobias and to over-attachment to the parents have not only received no attention, but have doubtless gone virtually unrecognized, their significance has been wholly unappreciated. Moreover, the social setting of the child has had its drawbacks, first, in the fact that he was an only child for eight years, secondly, in the fact that he has remained out of school for the past two years because of nervous invalidism, thus being deprived of the normal social milieu among other school children, so important to a boy of this age, and thirdly, because of the peculiar geographical situation of the island and the primitive social and economic conditions that prevail among its inhabitants (relative poverty, primitive occupations as fishing, hunting, etc., isolation from the great world outside, since there were communications only by radio and by occasional newspapers, limitation of opportunity for the development of higher interests because

of poor schools, scarcity of doctors and lawyers, and limitation of religious interests to a rather narrow evangelicalism and a yearly camp meeting without opportunity for contrasts with other moral and religious interests, and absence of opportunities for adequate development of the æsthetic and ethical impulses)

Is it any wonder that a boy derived from this neuropathic ancestry and developing under the faulty physical, mental and social conditions described should have suffered breakdown? Is it not rather a wonder that the whole population of the island should not have succumbed with him? The fact that a considerable proportion of the members of such a community may remain comparatively healthy, despite the existence of the general conditions described, witnesses to the strong resistance of the human organism to unfavorable conditions

COMMENTS UPON THE THERAPY

One of the advantages of the group method of study that prevails in this clinic lies in the probability of discovery of all the important factors that contribute to a malady, whether it be of genotypic or of environmental origin. Diagnosis should not be limited to the physical side of the organism alone or to the mental side of the organism alone but to both sides of every human phenotype. By group study we arrive at multi-dimensional diagnoses. We have seen in the present instance how a study, even though it has been restricted more than we like through circumstances not under the control of those who made the study, has revealed the existence of both abnormal hereditary tendencies and harmful environmental influences. We cannot, of course, change the abnormal inherited tendencies of this boy. They were fixed at the time of union of the parental gametes to form the zygote or fertilized egg-cell from which he has developed. A knowledge, however, of the nervous and mental abnormalities presented by the father and the father's mother, on the one hand, and by the mother's father, on the other, give us clues to possibilities of abnormal neural and mental tendencies in the offspring of this boy's parents, clues that had they been recognized early enough, might have done something toward ensuring the greater care and the exercise of physical, mental and social hygiene that inherited neuropathic or psychopathic tendency makes exceedingly important.

Nor can we alter the fact that the environment of this boy up to the present time has been far from satisfactory. We can, however, do much to remedy the baneful effects that have become observable and we may, perhaps, also do something toward improving the boy's environment in the future.

As you have heard, the infected tonsils and adenoids have been removed, the infected teeth have been extracted and the redundant and phimotic prepuce has been cut off. Moreover, since the patient has been in the hospital, he has been placed upon a regular régime and has received a diet suitable to his condition. Attention has been paid to the processes of elimination, and he has been surrounded by an atmosphere of security and of reassurance regarding his condition, so that he is now sleeping well and eating well. He not only appears content and happy, but he is desirous of returning to his home, where he feels that he can remain well now that certain physical defects have been remedied and certain dangers to his mental life have been made clear to him.

Much has been accomplished for this boy in a very short time here, but we should be cautious not to be over-optimistic as to the results thus far obtained. Good as the results that have been achieved certainly are, we have yet to see how the boy will behave on his return to his home environment. Undoubtedly this trip to Baltimore, his sojourn in the hospital, his multiple operations and what he has learned and is learning here generally about his condition will do much good, not only through the actual effects immediately obtained but also through the powerful suggestions they contain regarding his future welfare. How permanent the good effects of these suggestions will be and in how far it will be possible to fortify the physique and especially the nervous system of this patient through instruction about diet, exercise and other physical factors remains to be seen. We must lay especial stress upon the mental and social hygiene desirable for character training and for the development of the social and the economic independence of this boy. In persons of psychasthenic trend, a long training under good hygienic conditions is usually necessary in order permanently to get rid of symptoms or to reduce them to the minimum compatible with a given personality make-up.

I am passing around a little volume, "Concerning Parents," which contains a good many useful hints regarding the rearing of children. This little volume by Dr Bernard Sachs on "The Normal Child and How to Keep It Normal in Mind and Morals" is also useful, though it warns against the more fanatical methods of the psycho-analytical school.

We could be more optimistic about this boy's future if we could be sure of changing the familial and community conditions in which he has to live. Surely that island deserves the attention of the State Board of Health. A campaign of general hygienic education should be instituted there. Can one think of any place where periodic health examinations competently conducted could be more advantageous? But you have heard the report that there is only one doctor there and that he is alcoholic! I have not yet been able to check the truth or the falsity of this report. But in a community as primitive as this, without agriculture, without communication with the outside world, where indoor sports consist largely of sexual gratification and listening to jazz and to accounts of prize fights over the radio, where outside interests (aside from hunting and fishing) are limited to the empty gossip of a small and isolated population or to attendance upon services at the evangelical church (relieved, it is true, by a week's sojourn in tents at the annual camp meeting), where there is no art, no music except the church choir, no theatre, not even moving pictures (because the older people on the island do not approve of them), and where all the higher interests must be of a single brand (unless that one Catholic woman who lives away off "on one corner of the island" has something different to offer), should we judge very harshly the single doctor if he should, from time to time, seek relief and relaxation from alcohol? To know all is to forgive a great deal!

THE SOCIAL ECONOMIC PHASE OF HEART DISEASE

By WILLIAM EGBERT ROBERTSON, M D

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IT SEEMS necessary that we discuss our concept of heart disease, in order that we may have a common ground upon which to stand. We must agree upon the trustworthiness of the foundation, or we shall either be unable to erect a superstructure, or perhaps, having reared it, it may fall

In the final analysis, all forms of heart disease imply cardiac muscle yielding. Admittedly there are many grades of yielding, but this will depend in part upon the age of the individual and in part upon the amount of effort necessary in the daily routine. As long as the myocardium is relatively competent, the nature of the lesion is practically of minor importance, whether congenital or acquired. Pulmonary stenosis and the more severe grades of septal defect are fortunately rare. Even cases of marked septal defect, however, may exist over many years, given a good heart-muscle, as exemplified in the person of a sailor whose heart is now in the Mutter Museum of the College of Physicians in Philadelphia. He had an extensive congenital defect, yet he lived an arduous life and died at fifty-seven of a brain abscess, a not unusual complication of certain types of congenitally defective hearts. We are justified in omitting cases of this character, and also acute cases of endocarditis and pericarditis, for these may be grouped among all acute infections as far as our discussion is concerned. No person acutely ill from any cause can be a wage earner at the same time.

Our object is to view disease of the heart as a potential and as an established factor, in its relation to the social life and earning capacity of an individual, and, in a broader sense, to consider it apart from the individual. An individual case, no matter how serious, nor how pathetic, has but few points of contact. It is only when we appraise the effect of damaged hearts in a collective sense, as is now being done so efficiently by properly organized and well-directed effort in the case of tuberculosis, that we become able to appreciate

how wide is the path of its destructiveness, and how serious the economic loss

In the army draft during the late war, something over 200,000 men were rejected from among 5,000,000 men of draft age, or about 4 per cent. Assuming that men of draft age represent the best physical element of the country at large, we are justified in stating conservatively that there are at least 4,500,000 people in the United States with some form of heart disease. If only one-fifth of these are wage earners, averaging three persons per day, the daily economic loss will amount to \$2,700,000, or an annual loss of over \$842,000,000

The large insurance companies reject 2 per cent of those examined because of some readily recognizable form of heart disease

These figures do not include the extremes of life. Children, inclusive of those of school age, are especially liable to heart disease, and particularly the acute and subacute types. These are very destructive in their effects and the mortality rate is high. The efficiency of those who survive is impaired to a variable degree. Complete disability over a period of years in some, partial dependency in others. Their social relations are interfered with. The average life and enjoyments of the healthy are denied to the individual with heart disease. A prolonged charge upon the family or state, ill health prevents the acquisition of an education. Thus the survivors who reach the industrial age suffer in a double sense. They suffer from lack of education and utter want of ability for sustained effort, and for all effort of an arduous character. Those who recover and later marry, merely multiply the difficulties. Their earning capacity is lessened in proportion to the extent of heart damage. The home suffers. If the mother is the subject of heart disease, pregnancy is more or less precarious and not seldom fatal. Such mothers too lack the vitality necessary for the management of a house and family, and the children are given even less guidance and training than is usual. If the father is the subject of a heart lesion, the consequent social and economic loss is even more apparent. In the event of his death, his widow and children are likely to become dependents.

Another phase of the industrial situation occurs in those instances in which a person with a damaged heart obtains a position which may jeopardize the life or limb of those in his charge, such for

instance as a motorman, an engineer (locomotive or stationary), chauffeur, elevator operator, etc. Employers of labor and physicians to industrial plants have a duty in defending the public against such risks. They can, however, aid materially in an economic sense, by placing properly selected heart cases in such positions as to make them self-supporting, without increasing the risk to others.

The other extreme of life, the slippered pantaloone age, naturally includes a great number of heart cases. These are for the most part very different from those we have been considering, except insofar as they all depend upon muscle hypotonus. Necessarily included in any statistical study of heart disease in general, they cannot be taken into consideration in our attempt to view the subject in its social and economic relations. Of course the senile or presenile heart cases may become a charge upon society, but it is evident that their place in the scheme of life is a very limited one, and in no sense comparable with the group with which we are dealing.

Heart disease causes more deaths than either cancer or pulmonary tuberculosis, and it is on the increase. This must be true in the large cities where the speed mania is on the increase and competition is keener than in the rural communities. Some adumbration of this fact can be seen in the figures submitted in the report of the Provost Marshal General, on the operations of the Selective Service System of the draft.

In contrasting rejections for all causes in certain urban and rural sections, the General states that the urban communities selected were from the cities of New York, Chicago, Philadelphia, Cleveland, Milwaukee, Seattle, St. Louis, Cincinnati and New Orleans. Rural communities were taken from all states, using boards having less than 1200 registrants. On the basis of 100,000 examined in each group, 21.68 per cent were rejected of the urban group and 16.89 per cent of the rural group.

Pulmonary tuberculosis and heart disease are similar in that both are prone to attack the young. Both may be overcome in many instances, but they cause illnesses of long duration. The convalescence is prolonged, and recovered cases are usually substandard physically and liable to fresh outbreaks. Both offer obstacles in obtaining an education and in the social and industrial life of the victims. Both are practically ubiquitous, claiming great numbers of sufferers. Under

such circumstances, though the prevention and study of these diseases is a medical problem, the management of the established case becomes a social problem. Only a campaign of education can serve to focus attention on the heart case, as is being done with the tuberculous. An attempt is being made by the formation of State and National Heart Associations. The campaign is an expensive one, however, and it would seem advisable to unite with some such body as the National Tuberculosis Association. The former "New York Heart Association" has become the "Heart Committee of the New York Tuberculosis and Health Association, Inc." Since the problem is an enormous one, and tuberculosis and heart disease have many features in common, as already indicated, a greater work could be accomplished if the National Tuberculosis Society were to take over the work. The work must begin with the practising physician, however. He should note carefully the conditions of the mouth of all patients. Tonsils and adenoids in children especially, and teeth and gums and accessory nasal sinuses in all individuals. These can never be overlooked if the habit of making routine physical examinations is acquired. Records should be made and filed, for without them no basis of comparison is possible, and one's memory is not elastic enough to embrace all the people a physician attends in his daily service, much less possible then is it to remember details for any length of time.

All infections should be carefully guarded against. The Shick test applied to all children entering school for the first time. The Dick test and prophylactic injection also merit universal trial. So-called growing pains should be looked upon as possible precursors of heart disease, and the heart should be zealously studied just as it deserves to be after any attack of sore throat, no matter how mild, and during and for some time after any infection. Rheumatic fever and chorea especially demand particular care, and prolonged rest in bed, even if the temperature is normal, should be ordered whenever even the slightest suspicion of involvement of the heart occurs. It is often difficult to obtain the cooperation of the family in such cases. The parents or guardians have not been trained to understand the serious menace of a heart lesion to the future of the patient. Nor is this sufficient. Heart disease, and especially endocarditis, is often so insidious in its onset that the only harbingers may be a dis-

inclination for effort, lack of desire to play, ready fatigue or anæmia

It has always seemed to me that to petition the physicians to make routine physical and periodic examinations is a serious reflection on our profession. We should not need education along this line. That we do, however, is revealed by the growth of the cults. Their success is in large part the result of our failure to realize our moral obligation. Every patient seeking care at the hands of a doctor merits a physical examination, and this cannot be made through the clothing. Such an examination loses a large part of its value unless a record of it is made, no matter how brief the record may be. If this were the universal practice, tuberculosis and heart disease would be discovered in their incipency, and more exact diagnosis would become the rule. Prolonged rest under such conditions would forestall a certain proportion of chronic invalidism and suffering and economic loss which it is our privilege and duty to prevent. This is the first line of defence. The school physician, the physician engaged in industrial medicine, and the employer of labor, all have a share in the responsibility. The national organization will have for its function the education of the press and the public and the development of institutions for the intensive study of heart and lung cases. This is not being done at all at the present time. Tuberculosis sanatoria are splendid havens for the afflicted, but they have not advanced our knowledge in a very material way as far as any specific method of treatment for that disease is concerned.

I do not know the merits of the Spahlinger treatment, but it has been given wide publicity on the Continent and in England. Apparently it involves a large outlay for equipment. An attempt is being made by some of the English physicians to induce their government to take up the work. The point is, however, that investigative work requires both time and money, and this is possible only through the munificence of wealthy individuals or in state or nationally endowed institutions. The practising physician does not as a rule avail himself of all the possibilities open to him in his daily routine. Probably this is more true of the two widespread entities, tuberculosis and heart disease, than of any other condition with which he has to deal.

Many a case of tuberculosis masquerades for a greater or less length of time as neurasthenia or viceroptosis or even indigestion,

and a heart case may escape detection as a case of anæmia or bronchitis or congestion of the liver, or the hope may be expressed, in the case of a child, that it may grow out of it. Assuming, however, that we serve up to the level of our ability, take a history and make a careful examination, we are not adding to the sum total of knowledge unless we study the case in its broadest aspect, and in a collective manner. It is rare for medical knowledge to advance in a spectacular manner. The work on insulin is one of the few exceptions. Vaccination, on the other hand, was slow of acceptance, and Jenner suffered severely at the hands of his contemporaries among the profession, as did Semmelweis. Pasteur also was subjected to bitter criticism and not a little ridicule.

As individuals we should at least become a part of a large and organized body, for the work is a tremendous one with numerous avenues of endeavor, in which both professional and lay effort and large funds will be necessary for publicity and research, and the proper care of the afflicted.

(A continuation of the Department of Medicine will be found at the end of the volume.)

Surgery

SURGICAL DIAGNOSTIC CLINIC MUCINOUS CARCINOMA, LUES OR DISEASES OF THE ALIMENTARY TRACT *

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I HAVE two patients to present to you. A man, fifty-eight years of age, a factory worker, whose chief complaint is weakness and swelling of the abdomen. Nine months ago he noticed that his abdomen, or, as he expresses it, his "stomach" was becoming swollen, growing progressively worse during the past two months, and particularly during the last month, so that he is now unable to work. His appetite is good. The bowels are constipated, requiring repeated enemas for relief.

The patient states that he has never been ill except for the usual diseases of childhood. He was working every day up to nine months ago. He has occasional shortness of breath and palpitation on exertion, no cough, no hemoptysis, no vomiting or other gastric disturbance after eating.

He has three children, a brother and a father, all living and well. He has some alcoholic history. There is no family history of carcinoma.

On September 21, 1926, after iodine and alcohol preparation, the abdomen was explored through a left rectus incision seven centimetres long. A considerable amount of gelatinous fluid escaped. A large mass was found in the mesentery, which was covered with masses extending up to the liver and over the spleen and transverse colon. Several masses were incorporated in the parietal peritoneum. No operation was attempted. Two pieces of tumor were removed for biopsy examination and the abdomen was closed without drainage. The appendix was sought for but not found. The cæcum was not delivered.

* Given before the Interstate Post graduate Assembly, Cleveland, Ohio, October 18, 1926

When inspecting the abdomen the first thing to do is to get a proper exposure. Stand at the foot of the bed or of the examining table, as the case may be. Ask the patient to take a deep breath, then ask him to cough and then inquire whether this hurts. He replies, "No."

Next palpate the abdomen, lightness of touch is more informative than a heavy touch. We must be like the obstetrician who has eyes in the ends of his fingers, and can tell whether he has an anterior or a posterior presentation, although he cannot always tell the difference between a fibroid tumor and a pregnancy. As I palpate gently, I feel a sense of resistance especially in the lower abdomen, and on the left side there is resistance and resiliency, the latter suggesting the presence of fluid. On percussion there is dullness, flatness and resonance. The surgeon gains more information from auscultation than does the internist, because the internist usually examines only under extraordinary conditions. The use of the stethoscope in acute abdominal conditions is often an advantage, especially in acute conditions, as it relieves the patient of the weight of the examiner's head. The properly trained ear, however, still remains the best stethoscope. The stethoscope is useful as it magnifies sound, but the trained ear with normal hearing is better.

You will notice that while the patient was in the room I said nothing that would impress him unfavorably. I do not know what he has been told. I therefore prefer to read the diagnosis in his absence. It is metastatic mucoid carcinoma, which is said to be unusual in the male. It is practically undiagnosable except by incision and biopsy study. In this patient, as has occurred in other instances, the exploratory operation has been beneficial but not curative. I frequently operate on patients, hopeless so far as the pathological condition is concerned, who are much better after the exploratory laparotomy and the improvement is maintained for several months, after which they lapse and pass to the beyond. How do we explain this? We cannot explain but we can theorize. If you give a patient iodide of potassium, what is the physiological action of the drug? We do not know, but we say it alters the tissues and brings them closer to the normal condition. Therefore we speak of this drug as an alterative. Likewise the exposure of the abdominal

contents to the outside air seems to interfere with the disease process, and thus it has an alternative but not a curative effect.

If this man were to fall into the hands of some of the carcinoma experts they would try some serum, but to my mind such treatment is of no moment. We have as yet not found a cure except the application of the knife at the earliest possible moment, even before we definitely know that it is carcinoma

We have recently had two cases, both males, of mucoid carcinoma of the stomach operated on for subtotal gastrectomy in the Lankenau Clinic. The patients have been followed up for forty-two and forty-eight months, respectively, and are both in excellent condition, never having had any trouble whatever since the operation. The condition is supposed to be more common in the female than in the male. It simulates an ordinary carcinoma or a tuberculosis. When the mass is confined to the right iliac fossa and there is a sinus, one should bear in mind the possibility of actinomycosis. Actinomycosis of the caecum, however, is rarely met with and rarely on the opposite side of the abdomen. So we have to differentiate between carcinoma, tuberculosis and actinomycosis. As the mass is in the midline and there is no sinus, we may dismiss the thought of actinomycosis.

As for carcinoma and tuberculosis. We can rule out tuberculosis first by the history and, secondly, by the fact that the condition has been of only nine months' duration. Thirdly, by the fluid, which was gelatinous, while in tuberculosis the fluid is more likely to be ascitic. Furthermore, röntgenological examination of the chest shows no peribronchial thickening, particularly of the tuberculous type. Thus tuberculosis can also be ruled out.

This is the type of case one can talk a good deal about, but there is not much to be said about the treatment.

As to the condition of the female, there are many instances of a gelatinous condition associated with ovarian cyst. In fact, in handling some of these cysts the rubber gloves become so slippery that it is difficult to handle the viscera. Oftentimes these specimens, when sent to the laboratory, have been reported benign, but within six months or more after the operation the patient from whom such a specimen was taken returns with the abdomen swollen much as it was before operation. Re-operation then shows that the disease had advanced and the pathologist, having a somewhat better oppor-

FIG 1



Metastatic mucoid carcinoma of the gastro-intestinal tract

tunity to study the condition, reports "carcinoma." The practical point is that in operating on an ovarian cyst it is best to tell the family that an ovarian cyst that does not contain gelatinous matter was found. But if at the operation gelatinous material was present in the broad ligament, it is advisable frankly to say, "We found a condition which may recur." Among intelligent people that naturally excites suspicion and the question is asked, "Does this recurrence mean cancer?" In this way I prepare the family so that in the event of recurrence they will not be greatly surprised. But I never say anything to the patient.

The picture of carcinoma in these cases is about as follows. A systolic blood-pressure of 110 and a diastolic of 68, a certain degree of anæmia, with a red-cell count of 3,376,000 and a white count of 7000, weakness, abdominal distention, the presence of a palpable hard mass which does not move with respiration on account of the surrounding adhesions and its distance from the diaphragm, and which shows suspicions of metastases, to the liver and the transverse colon.

CASE II — This man is forty-four years of age, a Syrian by birth. The diagnosis is lues and gastric crises. The diagnosis of lues was made because he has a 4 plus Wassermann and a slightly diminished knee-jerk. Although I shall not take exception to that, it would not convince me that lues is the root of the evil. It is easy to learn by the spoken word and by the written page, but the experience of years of contact with patients is worth more than these. If one lives an active life gaining a large experience, by and by he will achieve some knowledge, and if he lives long enough he may acquire a little wisdom before he shuffles off this mortal coil. So shall we take advantage of our experience, our little knowledge and our little bit of wisdom.

The chief complaint of this patient is "stomach trouble." This trouble is from eight to ten years' duration. When I was teaching under-graduates I tried to make them understand that there is an art in judgment. When a patient presents a history of stomach trouble of eight or nine years' duration the student is impressed and he wonders why the condition has not been diagnosed during all that time. But let us proceed. Do you know what I have in mind? Frequently this is the history of ulcer. This patient has had many, many cures — by means of the Sippy diet — and he still lives to tell the tale. Now

let us see if this history works out with that thought The patient has had stomach trouble for the past eight or ten years, the greatest trouble is burning and eructation three or four hours after eating, usually associated with considerable gaseous distention, especially after the evening meal, rarely after breakfast. The attacks of burning are sometimes relieved by a glass or two of warm water, followed by vomiting For the past ten years the patient has given up fruits and fats, because he felt that they made him worse, and has kept to a diet of rice, potatoes, oatmeal, and black coffee He has had considerable medical treatment for the past two years During the last three weeks intravenous injections of salvarsan There is some diminution in the knee-jerk

Is this case one of specific disease of the stomach with gastric crises, a beginning locomotor ataxia? Or is it a case of disease of the alimentary, particularly of the intestinal tract? In favor of the former is the longstanding condition, while the rather typical history favors the latter You know as well as I do that ulcer cases often are atypical That is, they give no history that is indicative of ulcer Others are so clear that we scarcely have to see the patient to say what is the matter This man's history is atypical I shall ask him a few questions

Are you feeling better now than you were two or three weeks ago?

"Not in the stomach"

Are you unsteady in walking? Do you have any trouble in walking? When you put your foot down, do you feel certain that it will stay where you put it? Have you good control of your legs?

"Yes"

Place your hand where you have the most discomfort

(Patient placed his hand over the epigastrium)

He says he has most discomfort in the epigastrium You as well as I know that the early pain in the chronic abdomen is nearly always referred to the epigastrium. Take the gall-bladder—epigastric distress Early ulcer—epigastric distress Pancreatic disease—epigastric distress

Have you lost any weight?

"About 15 pounds"

As you look at the abdomen it is scaphoid at the upper portion

There is a slight palpable enlargement of the inguinal glands. There are two scars over Poupart's ligament, evidence of a hernia operation. This was done eight years ago, according to the patient's statement. The abdomen is neither flaccid nor markedly rigid. I place my finger at the point that corresponds to the fundus of the gall-bladder. I have observed that in a considerable number of cases of duodenal ulcer pressure at the middle or upper portion of the right rectus muscle will elicit pain or distress. It does so in this case. The patient says it hurts. Recent roentgenologic studies of the gastro-intestinal tract were negative. What condition other than lues or gastric crises might be responsible for the trouble of which he complains? Gastric crises, by the way, is a condition that is often overlooked. I have, on occasion, been called upon to operate for symptoms of an acute abdomen. On studying the patient, I suspected gastric crises or disease of the spinal cord, and I asked for further consultation. A neurologist was called in and under neurological treatment the patient got well. Therefore we must bear in mind that this may be a case of lues.

It may also be a case of duodenal ulcer or of early gall-bladder disease. One of the most difficult diagnoses is the early differentiation between duodenal ulcer and chronic cholecystitis. When you have a gall-bladder that is palpable, smooth, and ascends and descends on respiration—it may or may not be tender—and the swelling is not over the right kidney, the diagnosis is clear. One of the most experienced internists has said he frequently finds that when he makes a diagnosis of chronic gall-bladder it turns out to be duodenal ulcer, and when he makes a diagnosis of duodenal ulcer it proves to be chronic cholecystitis. I, too, have made that mistake many times, and expect to make it many more. I do not know of any way to make the differentiation without positive roentgenologic findings—such as in ulcer the presence of a niche or crater and the characteristic deformity of the duodenum, but again, deformity of the duodenum does not necessarily mean ulcer. The duodenum can be brought up by pericolic adhesions. The gall-bladder can be visualized by means of cholecystography, one of the most useful means we have of differentiating between duodenal ulcer and gall-bladder disease, but it also is not infallible. Therefore, we must be governed by how much the individual is suffering and how much relief

he has obtained by the treatment to which he has been subjected and leave the pathology to be demonstrated only after the abdomen has been opened

I do not know what my Cleveland friends think. I know, however, that in Philadelphia this patient would be given a trial of specific treatment. If, after that treatment for a reasonable length of time, there was no improvement, and he continued to have the same gastric disturbance, pain coming on three or four hours after meals, particularly after the mid-day or evening meal, with vomiting and gaseous eructations, and relieved by food or sodium bicarbonate, I certainly would open his abdomen and I would expect to find some lesion of the duodenum.

Now what about duodenal ulcer and ulcer adjacent thereto? Ulcer near the pyloric end of the stomach gives the same symptoms as ulcer of the duodenum, on account of the proximity of the two locations. The majority of ulcers are five to seven centimetres distal to the pylorus on the lesser curvature, rarely closer to the pylorus. Frequently there is seen in the region of the pylorus a change which is diagnosed by the roentgenologist and occasionally by the surgeon as gastric ulcer, but thorough examination of such a case will usually reveal an ulcer of the duodenum and also a peri-ulcerous exudate extending upward and involving the pylorus. The majority of cases of pyloric obstruction are not of the gastric but of the duodenal type. Gastric ulcer is a slipshod diagnosis. How often do we hear the diagnosis, gastric ulcer, when the condition is gastropptosis! Even those who delve into the abdominal cavity and make excursions into its nooks and corners often fail to make these differentiations. I do not say much, but I look, and, like the Irishman, "keep up a devil of a thinking." The differentiation between gastric ulcer and gastritis can be made in two ways only—by the Röntgen-ray and by sight and touch. That is not original with me. Sir Berkeley Moynihan says in effect, "In my experience when I operate on ulcer, it is in the appendix or in the gall-bladder, it is rarely in the stomach."

I compliment the physician who studied this case and worked out the blood-chemistry. The specific treatment can do no harm and may do good, and if the local trouble does not clear up it will be time to resort to something more radical.

SEVERE COMPOUND FRACTURE OF THE RADIUS AND ULNA

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SUMMARY

Severe Compound Fracture of the Radius and Ulna—Virulent Infection—Resection of Radius and Ulna—Sloughing of Flexor Tendons—Subsequent Fusion of Radius and Ulna—Subsequent Plastic Operation on Tendons—Ultimate Result

ELMER ANDERSON, No 37146, Evanston Hospital, admitted July 17, 1922

This patient was a boy of ten years. Just prior to admission he had fallen from a tree, injuring his left arm. When first seen shortly after admission the boy was in excellent condition and suffering but slight pain. Through a transverse wound some 3-4 cm. in length and on the flexor surface of the left forearm projected the shaft of the left radius, which was bare save for a few portions of muscular attachments. Dirt and grass were thoroughly ground into the wound and the projecting bone. The X-ray report at this time was: "(1) Fracture of the left ulna $\frac{3}{4}$ inch from the lower end with marked displacement. (2) Complete separation of the epiphysis of the left radius, the shaft of the radius projecting through the soft parts" (Fig 1). The patient was anesthetized and the wound thoroughly cleansed and treated with iodine. The epiphyseal separation was reduced and the skin wound enlarged to permit the introduction of drains. A posterior plaster splint was loosely applied and the patient was put to bed.

On the next day the patient did not look well. The mouth temperature was 101 and the pulse 110. On removing the dressing the wound gave cause for considerable alarm. There was a marked odor from it, which reminded the writer strongly of that associated with gas gangrene in the war wounds. The skin was somewhat reddened and the entire neighborhood of the wound considerably swollen. The flesh which presented in the wound was almost black and from it, on slight pressure, appeared small gas bubbles and thin watery secretion. There was little if any pus. A smear of the wound was found to contain large Gram positive bacilli. A tentative diagnosis of gas gangrene was made and it was determined to debride the wound and secure wide open drainage. The patient was again anesthetized and the wound was extensively enlarged by a longitudinal incision. It was found that the infection had progressed with great rapidity. Much of the muscle tissue was dark colored and did not bleed on manipulation. In the deeper layers there was a moderate amount of thin pus. The periosteum of the radius was completely dissected off for a distance of some 8-9 cm.

After a careful survey of the situation it was decided that a radical procedure would be necessary to save the hand and perhaps the arm. It was felt that the infection in the wound was unusually virulent and was dominated by the organisms of gas gangrene.

Mere longitudinal incisions into the soft parts involved some difficulty in adequately draining the tissues subjacent to the taught flexion tendons of the wrist. The complete denudation of a segment of the radius of its periosteum placed that section of bone in no little hazard. Accordingly a resection of radius and ulna was determined upon—a step which doubtless had but little precedent but which subsequent events seemed to justify. Some 3 cm of the shaft of each bone was removed, leaving about 2 cm of the distal portion in each case. This immediately allowed a ready division of the tendons and muscle bellies and the introduction of numerous Carrel tubes. An incision was also made on the dorsal surface of the wrist. The patient was returned to bed and 25 cc of Dakin's solution were injected into each tube every four hours.

Cultures of the wound were taken at the time of this operation and their report is of interest. "Cultures (anaërobic) show large Gram positive bacilli resembling Welch's bacillus in morphology but atypical in culture and animal inoculation. Direct smear showed a large Gram-positive bacillus in symbiosis with a small coccus—probably streptococcus. A hemolytic streptococcus was obtained from both aerobic and anaërobic cultures." The urine was negative. The leukocyte count was 21,500.

From this time began a strenuous battle with infection. The wound was dressed daily under gas oxygen anaesthesia, the child receiving no less than twenty four anaesthetics, without apparent ill effects. At each dressing necrotic areas of muscle were débrided, pus pockets which had accumulated between the muscle bellies were evacuated, and debris and pus were removed by irrigation with Dakin's solution. In these dressings it was generally customary to turn the hand back over on the upper forearm to facilitate access to the infected areas. The arm was put in a plaster cast from which a large section was removed, save for metal braces, to allow ready access to the wound. It was very disheartening from day to day, to observe the fate of the flexor tendons. These tendons bridged the gap in the wound much as violin strings bridge the sound opening in a violin. The destructive action of the infection steadily eroded one strand of tendon after another, which would part and the ends retract, until finally but a few strands remained which, as nearly as could be ascertained, supplied the index, middle and ring fingers. The temperature curve showed a septic course ranging from 99° to 103.4° (mouth). The pulse averaged 110 but was occasionally over 130. On the sixty first day after admission the cast was removed and the forearm was bandaged to a wooden splint. There was little, if any, union at this time. Two days after (September 17, 1922) the patient was discharged from the hospital for further dressings at the office. At this time the X ray report was "End of radius shows absorption and beginning attachment to the free radial end. An abundance of callus laid down between forearm bones. Ulnar tip is becoming fastened in as good position as can be expected."

At this time there was very little flexor motion in the index and middle fingers, but none in the others. It was thought that after the wound healed, tendon grafting would be a hopeful procedure.

After some two months of office dressings, the patient was readmitted to the hospital for two days on November 22, 1922, and a sequestrum was removed. On January 13, 1923, the patient was again admitted to the hospital and a portion of the infected cancellous bone was removed, particularly from the ulna. This procedure was done to correct the tendency of overgrowth of the

FIG 1



X ray showing condition on admission to the hospital, July 17 1922

FIG 2



X-ray showing condition on December 14 1923. Note fusion of radius and ulna

ulna which was causing an angulation of the wrist to the radial side. The patient remained in the hospital sixteen days, on this admission, and was given, in all, four anaesthetics.

After this the wound healed rapidly and no further incisions were necessary. Massage by a competent Swedish masseuse was started as soon as possible and assiduously persisted in.

After a few months of active play on the part of the child, the return of function in the index finger and middle finger was surprising. Moreover, there seemed evidence of slight return in the others. The flexor tendons seem to be very firmly adherent to the large amount of scar tissue of the wound on the palmar surface of the wrist.

While it seemed that eventually some plastic operation to free or to graft tendons would be necessary, it was determined to watch the wrist from month to month and get the maximum improvement before operation. This course was very gratifying.

In December, 1923, he could use the hand in catching a ball and playing marbles. There was full and strong flexion of the middle and ring fingers. There was practically no flexion of the index finger and none of the thumb. These latter two digits, however, could be and were powerfully adducted without flexion and were of great assistance to the other three fingers. Flexion of the hand on the arm was excellent but extension past the line of forearm slight.

During the last week in December, 1923, an abscess in the middle of the flexion surface of the forearm opened spontaneously and, after evacuation of, perhaps, half a dram of pus, healed quickly.

The X ray at this time (Fig 2) showed fusion of the distal ends of the radius and ulna.

The patient was again admitted to the Evanston Hospital on February 8, 1924, and the next day the arm was operated upon in an attempt to increase the extension of the hand on the arm, and if possible to improve the flexor action of the fingers.

Under ether anaesthesia over three hours of careful dissection was done. The large skin scar was first removed. Then with great care large quantities of dense and firm scar tissue were removed after careful search through them failed to reveal the presence of tendons or other important structures. The tendons of the flexor sublimis digitorum were found to be intact and functioning. The tendon of the flexor carpi radialis was found to be markedly redundant and this accordingly was shortened by resection. The proximal end of the distal portion of the flexor longus pollicis was found firmly attached to the radius by dense scar tissue. This end was freed and with some difficulty the distal end of the proximal portion of this tendon was isolated and the two sutured together by a linen suture. The proximal ends of the distal portions of the flexor profundus digitorum were isolated from the scar tissue with some difficulty. A separate strand for the little finger was very evident. As it was impossible to find the distal ends of the proximal portions of the flexor profundus digitorum tendons, the freed proximal ends of the distal portion were sutured directly to the healthy tendons of the flexor sublimis digitorum.

The wound was closed with three gutta percha drains. These were removed on the second day, and save for a slight amount of superficial infection the

wound healed satisfactorily. The patient was discharged from the hospital on the ninth day post operative.

Examination, January 11, 1927—The normal arm is $9\frac{1}{2}$ inches long as measured from tip of olecranon to the styloid process of the ulna. The corresponding measurement on the affected arm is $6\frac{1}{2}$ inches. There is perfect flexion and extension at the elbow-joint. There is a complete absence of supination and pronation. The forearm shows well-developed musculature and the grip of the hand is firm and strong. The flexors and extensors of the thumb function but very slightly, most of the motion in the thumb being caused by abductors and adductors. Flexion and extension in the index and middle fingers are practically normal when tested individually. There is very slight flexion and extension in the ring and little fingers when tested individually. However, when the four fingers are flexed as a group the ring and little fingers act with the index and middle fingers.

The patient participates in all of the sports and activities of a boy of four teen years, baseball, soccer, football, etc., and he uses his fingers and hand with great skill in tying his tie and even playing the piano. The strength of the hand is evidenced by the fact that he is able to hang by his hand from a bar.

There has been progressive improvement in the last year and there is reason to believe that still further improvement will occur.

THE SUCCESSFUL TREATMENT OF PRURITUS ANI

By J. F. MONTAGUE, M.D., F.A.C.S

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ON THE basis of what may be justly considered an intensive experience with pruritus ani, I have come to the conclusion that this disease is, in every instance, completely and permanently curable. Since 1922, I have seen and treated 316 cases and out of the 287 on which I have recent reports recovery has been complete

A report so singularly optimistic must indeed evoke interest if only by contrast to that popular opinion of this ailment which holds it to be an intractable, if not altogether incurable, affliction. Lest, however, its optimistic note should induce in the reader a hope that I offer some new drug or method which will cure every case, it might be well to state, at this point, that such is not the case. No one method of treatment can be relied upon to cure each and every case unless it be that frequently neglected therapeutic agent—judgment. Those who are familiar with my contributions to the literature of pruritus ani know that I hold no brief for the indiscriminate salve slinging which all too often is indulged in to the exclusion of an earnest study of the clinical problem which each of these cases constitutes

The first step to be taken in the analysis of any given case of pruritus ani is the performance of a thoroughly complete physical examination. It will be readily seen this constitutes the reversal of that clinical maxim which states that "no physical examination is complete without a rectal examination." In cases of pruritus ani it will be particularly advantageous to supplement local examination with a thorough general examination

A general physical examination in a case of pruritus ani has two main objectives

(1) To determine whether the anal pruritus is part of a generalized pruritus or whether it is a distinctly local condition

(2) To determine the presence or absence of pelvic or abdominal disease which might possibly be causing anal pruritus by virtue of misreference

The importance of the latter will be readily appreciated when we realize that all cases of pruritus will be found to fall into one of two groups:

(1) Those in which the cause of the pruritus consists of some abnormal condition existing in the area which "itches." This abnormal state of affairs is sufficient to irritate the sensory nerve-endings of this area and hence the pruritus it causes is known as direct pruritus

(2) Those in which we have no visible evidence of sufficient local cause for the itching of which the patient complains and in which cases thorough examination will always disclose the existence of some form of visceral disease which is the source of a stream of irritant stimuli whose local sign is erroneously referred to the skin area about the anus rather than the splanchnic area which is its true source.

At this point I wish to point out the possibility of error in judgment which in my opinion is responsible for failure in curing and, in some instances, is responsible for the recurrence of pruritus. All cases of pruritus referred to the anal region have one thing in common, *i e.*, their dominant symptom is itching, and the natural physiological reaction to this symptom is scratching. As a consequence of the trauma inflicted by violent or long-continued scratching, further skin changes occur which have a characteristic appearance. These have been described in detail in my monograph and elsewhere. In an area so constantly polluted with bacterial flora, injuries to the skin frequently result in infections since the unbroken skin represents the chief barrier to such infection. In view of the foregoing, it stands to reason that, regardless of the type of pruritus we are dealing with, the effects in the form of skin changes are identical in character, if not in degree, in all cases, if the itching has existed for any great length of time. If, therefore, the case presents itself at such stage of its existence we are very liable to make the error of considering the skin changes in themselves sufficient cause for the patients' symptoms. Moreover, we are likely to throw up our hands in desperation if treatment directed at these local skin changes does not completely cure the condition. It further stands to reason that, even if we are able to completely restore the skin to its normal texture and structure,

we would have then succeeded in removing only part of the cause of the itching in a case due to indirect pruritus. This type, it will be recalled, is one in which the itching arises by misreference from the disordered viscera. If the reader will go over the last paragraph again and at the same time reflect upon those cases of failure in the treatment of pruritus which he has seen, I believe he will readily agree that the failure to cure, or to prevent recurrence, was entirely due to a disregard of this factor.

Once more the importance of general physical examination in every case of pruritus ani becomes evident. The abdominal and more particularly the pelvic viscera *must* be thoroughly investigated. Concerning the need of a thorough local examination of the anus and rectum I do not believe there can be any question. It is indispensable to a thorough understanding of the case in question.

The value of a preliminary study such as I have outlined will be seen when we move on to the matter of treatment. By virtue of such study we are put in the possession of a systematic method of approach to what must otherwise remain a chaotic group of negative signs and distressingly positive symptoms. Treatment now resolves itself into one line of procedure rather than a hit-and-miss barrage of medicaments whose effect is as uncertain as its method of administration. Happily, we have at our disposal efficient means of combating both the direct and indirect type of pruritus.

TREATMENT OF THE DIRECT TYPE

Depending upon certain indications four types of therapeutic procedure may be reasonably employed. These are

- (1) Cauterization of exposed sensory nerve-endings
- (2) The use of protective ointments
- (3) The sensible employment of vaccines
- (4) Utilization of the undercutting operation.

The indications, rationale and technic of these methods are outlined briefly as follows

When excoriation occurs the minute filaments of the sensory nerve-endings are exposed to the air, to the action of mucus and other secretions. The irritation which naturally results from such an abnormal state of affairs gives rise to an increased desire to

scratch To avoid the establishment of what thus threatens to be a vicious circle, such an area should be cauterized with a 10 per cent. aqueous solution of silver nitrate. Such cauterization is of great temporary value and if supplemented by protective ointments will do much to avoid further skin changes

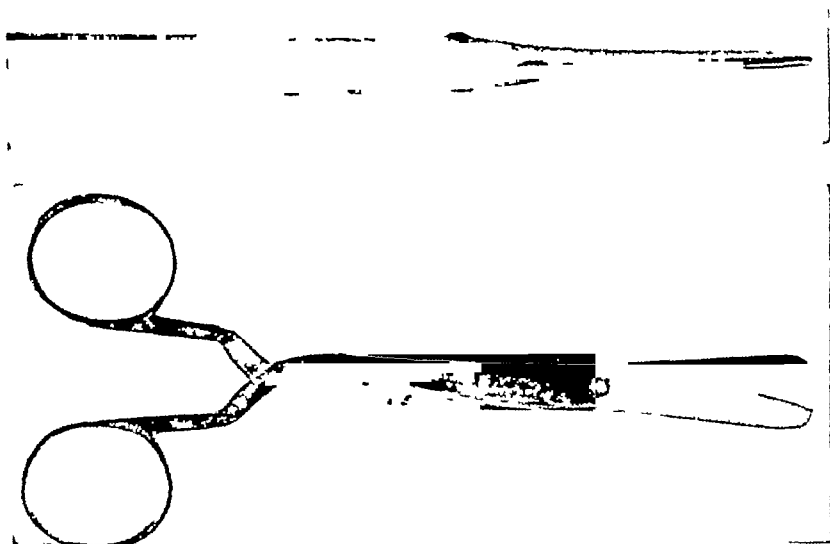
The object of protective ointments is to exclude air and particularly water from the exposed sensory nerve-endings just mentioned Almost any bland ointment is as good as any other for this purpose Vaseline, boric ointment, zinc oxide ointment made from lanolin or Lassar's paste are those which I most commonly use for this purpose. Mild protective ointment such as the foregoing will be found much more satisfactory than the anaesthetic ointments since the latter are exceedingly prone to become intolerable to the skin.

By sensible employment of vaccines, I mean the utilization of those vaccines which may reasonably be supposed as capable of exerting beneficent influence and moreover the use of these with a full understanding of what they are intended for and, what is more to the point, what they are *not* intended for As an example of the latter I might mention that vaccines employed in pruritus ani are not intended as a means of removing primary causes such as local pathology or visceral disease Their one and only purpose is to raise immune resistance to those organisms which have been demonstrated to be actual invaders. The vaccine I use is Pruritus Vaccine, Lederle I have used it in this series of cases and believe it has done much to minimize the low-grade dermal infection which is always a possibility in these cases.

The undercutting operation is a very simple procedure which consists of the severing of the sensory nerves immediately under the skin in the peri-anal region This is done by means of a special pair of scissors shown in Fig 1, through small incisions as indicated It is an extremely simple procedure and may be done under local anaesthesia in ten minutes or less The rationale for the employment of this operation is as follows

Itching causes scratching and this scratching damages the skin In the repair of this damage, fibrosis of the papillary layer of the corium occurs and in the inevitable contraction of this newly formed fibrous tissue the sensory nerve-endings in this area are

FIG 1



Forceps and double-edged dissection scissors Used in undercutting operation for pruritus.

compressed Compression gives rise to a stream of irritant stimuli which in consciousness are recognized as itching The itching naturally gives rise to a further desire to scratch. We have, therefore, a vicious circle as follows

Itching causes scratching Scratching indirectly causes fibrosis and this in turn by compressing the nerve-endings causes increased itching Now, therefore, if we break this vicious circle by severing the nerve-endings we allow the skin sufficient sensory rest to accomplish healing The operation is only part of the cure and its main object is to allow the correction of the skin damage done and to prevent the occurrence of further skin damage

TREATMENT OF THE INDIRECT TYPE

The treatment of itching arising from the misreference of irritant stimuli from diseased pelvic or abdominal organs resolves itself firstly into the treatment of any secondary direct pruritus which may have been induced and then to a correction of the primary visceral disorders The treatment of the direct pruritus has of course been outlined in the earlier part of this article The correction of the visceral disease of course depends upon the actual condition present I do not believe it will be necessary or appropriate to dilate upon this subject here I believe I have done my duty by calling attention to the causative relation which such pelvic disease frequently bears to pruritus ani The actual treatment of these diseases may readily be studied in the standard text-books on gynæcological and genito-urinary diseases

In the foregoing I have outlined briefly the means by which cases of pruritus ani may be successfully treated Much greater detail than can be appropriately given here will be found in my monograph on the subject entitled "Pruritus of the Perineum" (Paul B Hoeber, Inc, New York) I hope that my comments will induce a more rational approach and treatment of the problem that these cases present than has hitherto been customary I trust too that my obviously optimistic statements regarding the curability of pruritus will do something toward decreasing the horror of hopelessness with which the condition is viewed by laymen and physicians alike Of one thing be certain *Every case of pruritus ani can be cured*

THE SURGICAL PATIENT IN EXTREMIS

By G S FOSTER, M D

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THE average, everyday case that comes to the hospital for some surgical procedure usually follows a normal course. This case on admission is ambulatory, has been observed for a longer or shorter period outside and is suffering from some semi-chronic or chronic condition. They enter in fairly good condition, having had the usual laboratory and X-ray investigation outside. They enter for the operation fully prepared or spend from three days to a week in the hospital under additional observation and pre-operative preparation. These cases may be termed good surgical risks and clinically give very little trouble.

On the other hand, there are those patients who come to the hospital with a very acute surgical condition, in very poor condition, some of them even moribund, and although they are very poor surgical risks demand immediate surgical interference as the only chance for life. It is true that some of the cases of this class cannot be saved by any surgical procedure. They would die without the one chance they have from surgical interference and even with the best in surgery they succumb.

It is this class which we will discuss this evening and outline the surgical procedure, insofar as assisting adjuncts are concerned, with one object in mind, that is, to show that there are some cases who do recover. Among these may be mentioned those who enter with a general or localized peritonitis secondary to some acute intra-abdominal condition such as a ruptured appendix, ruptured abscess of the gall-bladder, perforated duodenal or gastric ulcer, intestinal obstruction, incarcerated or a strangulated hernia, etc., septic genito-urinary tract, post-abortion and post-partem septicæmia, septic phlebitis of the broad ligaments (post-partem). There are also the old, long-drawn-out prostate gland cases who become chronic catheter users and suddenly develop urinary obstruction. These enter fully septic and in very poor condition.

We might include those cases of traumatic amputations or crush-

ing injuries of the extremities complicated by the two great hazards, marked loss of blood and the secondary nerve shock from the injury, the cases of skull fracture with that extreme cerebral concussion, depression or both complicated by the usual line of central nervous system syndromes which place the patient on the immediate danger list, the cases of gun-shot wounds of the abdomen or chest, ruptured spleen, kidney or liver followed ordinarily by an immediate markedly depressing nervous reaction or internal bleeding resulting in collapse.

In just what way has surgery advanced in the last decade or two so as to lower the previously high mortality rate in each instance?

Every hospital organization of a high type is composed of medical men, deep thinkers, keen observers, energetic, tireless workers and extensive readers as well as good listeners, always ready to learn something new and try it out with the one hope that it will save some of these otherwise fatal cases

Here in our own clinic we are endeavoring all the time to lower our surgical mortality rate. We are bound to "*meet all comers*" and must necessarily run the gauntlet of hazards with the hope of a smoother track ahead. We cannot choose our acute, surgical emergencies that are *in extremis*. It is because of our organized effort that we have these cases brought to us and we must do our best. However, a certain systematized régime has been followed for some time past with the result that some cases of recent years have survived who, in the earlier years, would surely have died without these adjuncts

All *in extremis* cases on admission are super-heated, that is, they are immediately encased in warm blankets and surrounded by hot-water bottles, thus economizing on the radiation of the body surface. We desire to conserve all the body heat possible, thus protecting thermolysis and thermogenesis to such a degree that the patient wastes no nervous effort in extra bodily heat production.

In all cases, morphine and atropine, unless contra-indicated or administered previous to entry, are given hypodermically immediately on admission. We have long since considered morphine as a cardiac stimulant and conserver of nerve energy.

All pre-operative preparations, such as shaving, bathing, and the like, are accomplished as expeditiously and smoothly as is possible,

always remembering to expose as little of the body surface as possible, thus forestalling any liability of undue body surface radiation

In the operating room the cooperation between the operator and his assistant must be complete in every detail. Any operation is done as speedily as is safe, for speed and dexterity at the operating table save many lives

When there is an extremis case on the operating table we have learned that super-saturation of the soft tissues will do much toward forestalling surgical shock. To this end we give axillary sup, that is, normal saline solution or sterile water continuously during the operation. This fluid is gravitated from a reservoir down through rubber tubing into a needle piercing the pectoral muscles to the axillary spaces, filling these spaces with fluid. Some patients take as much as one or even two quarts during a very short period of time. We have found that by this super-saturation or water logging of the tissues that the patients often leave the operating table in far better condition than when they entered. Under this drinking-in during the operative procedure the anæsthetist notices that the pulse steadies down and gains in volume. We have also learned by observation over a somewhat large series of cases that very few who have axillary sup have post-anæsthetic vomiting. This would prove our long-contended point that post-anæsthetic vomiting is a toxæmia directly affecting the gastric mucosa. By diluting this toxæmia the vomiting is eliminated, which is certainly a very great relief to the patient.

The maintenance of an even, slightly elevated, body temperature during an operation is a very essential thing. The operating table should always be well heated with hot-water bottles and the patient kept well supplied with such external heat during the entire procedure. Any unnecessary exposure of body surface should always be guarded against. If we can prevent undue body surface heat radiation or keep it down to a minimum we certainly will assist much in forestalling one contributing factor, shock, and make the recovery more comfortable for the patient. The same precautions regarding body surface heat radiation should be maintained while transporting the patient and after he is returned to bed.

Posture of the patient on the operating table is a very vital part of good team work in the operating room. Always have the

operating table well padded and make sure that no part of the patient is in a strained position. Not infrequently in the past we have heard patients complain, after operation, of backache, leg ache, arm ache or some other trouble. This merely shows muscle strain on the part, due to a strained or bad posture during complete anæsthesia.

In recent years with added attention to careful placement of extremities and proper padding of the small of the back and shoulders these complaints are conspicuous by their absence. Certainly if we are to exert every effort for the comfort of the patient at all times, our keenest senses should be alert when the patient is under an anæsthetic. Proper posture on the operating table means greater ease and comfort during convalescence.

Regarding hemorrhage either when producing secondary anæmia as present upon admission following a pre-entry stage of greater or less length of active bleeding or when occurring upon the operating table as sometimes we find in uterine, gall-bladder or liver surgery, every precaution should be taken to minimize this loss of vital fluid. Another point we must not forget is prophylaxis regarding anticipated hemorrhage such as we find in hemophiliacs, lengthened coagulation time and in gall-bladder, liver or even in spleen surgery. This brings forward the fact that coagulation time as a part of the routine laboratory investigation should always be tested. In any case of anticipated difficulty we give calcium lactate grains ten (10) in capsule, three times a day for a week or so previous to the date set for operation. This should be checked up by repeated tests for determination of coagulation time.

We have found that active venous or capillary oozing, not possible to control by clamping and ligature, will generally be retarded by the pressure for a few moments of active hot gauze pack. In addition normal horse serum, thromboplastin, coagulin and adrenalin all assist when given the patient on the operating table. Two of these to the patient as a routine in gall-bladder, liver, spleen, hysterectomy cases and the like are administered. In our hands this routine has brought forth a feeling of safety regarding any important bleeding post-operatively or secondarily. This is generally continued for the first forty-eight hours. That this may seem rather unnecessary as a rule, the one infrequent case that it saves proves the real efficacy of the rule. When it is thought wise the gauze pack is left in for three or

four days, acting as an indicating governor regarding undue loss of blood. Transfusions are certainly timely if necessary, but are overdone in some instances and could be omitted.

In closing, we should not overlook the influence of pain nerve transmission in the patient under a general anæsthetic. When the patient is conscious and we are doing an operation under local analgesia the patient himself can guard us against any infringement upon this pain nerve transmission. A general anæsthetic merely renders a patient unconscious and by so doing removes the element of fear from the mental phase and produces muscular relaxation. Even under a general anæsthetic the patient still suffers pain nerve transmission and while unconscious of this fact, the destruction of the cerebral cortex cells goes on. We have learned that nerve-block by infiltration will prevent pain nerve transmission and by so doing reduce the liability of added surgical shock. For this reason we block all nerves within the operative area, even when a general anæsthetic is used. In other words, if the patient were conscious rather than unconscious, there would be no pain nerve transmission.

By following out these few simple details many cases coming to us in extremis pass through the operative procedure well and we feel that in some instances, at least, lives are spared that would otherwise be sacrificed.

Public Health

HEALTH SUPERVISION OF COUNTRY DAY SCHOOLS *

By RICHARD M SMITH, M D

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THE health supervision of a country day school for boys or girls presents most of the problems associated with a public school and many of those of a boarding school. The day school has both advantages and disadvantages in comparison with the boarding school. Its chief individual characteristic is the division of the child's time between home and school with the result that neither parents nor school-masters are able to have complete supervision during the twenty-four hours of the day. In this it resembles closely the public school. In order to accomplish good results in the matter of health, close cooperation between the parents and the school is essential. The two must work together and consider the child's life as a whole or no satisfactory protection of his health can be secured. The final responsibility for the child rests with the parents, and any arrangement which fails to take this into consideration will in the end be unsuccessful. It is true that some parents take the attitude that their child is sent to school to be taken care of for the time that he is away, and have little interest in what is done for him during that time. The children of such parents will suffer in every phase of their lives. The school can do much to educate these parents to a sense of their true obligation. This is to be done not by taking away from them their responsibilities but by securing their interest and cooperation for the good of the child. Parents and school authorities must look to physicians for guidance in matters relating to health and although members of the medical profession cannot assume to dictate the school program, neither can they ignore the educational features of the school, if they are to give advice which is of real or practical value. The life of the child is a unit. Health and education cannot be separated. The physician must be able to see the

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whole day's activities to decide intelligently about their effect upon the health of the child

We must take it for granted that our object in sending a boy or girl to school is not simply to crowd his or her mind with information, much of which will soon be forgotten, but to prepare him or her to live a happy, healthy, and useful life. Any activities which interfere with this ultimate aim must be abandoned and all procedures which aid in attaining it should be adopted.

We might assume that country day schools would give adequate consideration to the physical well-being of their pupils, as well as to provide superior educational advantages. These schools have been developed almost entirely for the children of the well-to-do in the community where every facility for the good of the child is desired by the parents. But leadership in health matters has been almost entirely in the public schools. The better private schools, however, now recognize the need of adequate physical care for their pupils, but a satisfactory plan to realize this need has been adopted in only a comparative few of them. Frequently financial considerations have prevented the carrying out of an ideal scheme because of the fear that the additional expense involved would not be recognized as producing corresponding benefits. It would seem that no argument should be necessary to prove the importance of good physical care for school children, not only in order that school work may be accomplished satisfactorily, but that the child may be in good physical condition in later life. Many studies have been made, indicating the direct association between physical condition and school work. It is not necessary for me to discuss these in detail, but it is perhaps desirable to call attention to the fact that such a connection exists and that we are really not giving a child his rightful preparation for life unless we are safeguarding his health with the same care that we exercise to secure his proper educational development.

I should like to discuss the health supervision of a country day school as it has developed in my mind during the last ten years, during which time I have been more or less intimately connected with several such schools for boys in the vicinity of Boston. Much of this may be repetition of what has been said already and is applicable to boarding schools and to public schools also, but it is necessary to pre-

sent the situation as a whole in order to see the various features of the plan in their relations to each other

We may consider health supervision under four main divisions. First, the sanitation of the buildings and equipment, second, the arrangement of the school schedule, third, the physical care of the pupils and, fourth, health education

The sanitation of the buildings and equipment I shall not discuss except to call attention to the fact that they ought to be excellent and certainly ought not to be below the standards for a public school. We find frequently that country day schools are conducting classes in buildings that were not originally planned for school purposes and satisfactory alterations are impossible. Overcrowding in the rooms is common. There is poor lighting, no proper provision for heating, no satisfactory arrangement for ventilation, no attempt to regulate humidity, and there are insufficient or poorly arranged toilet and washing facilities. The school furniture is usually good because it is bought new and is maintained in good condition.

The preparation of the school schedule is primarily in the hands of the school authorities, but it is here that cooperation is most essential. It is to be remembered that the boy lives a continuous existence from seven o'clock one morning to seven o'clock the next morning and that the time spent at school cannot be considered apart from the rest of the day. It is reasonable to think that a physician might be able to give helpful assistance in determining the amount of time which a boy of any given age should spend in study, exercise, and rest, and the proper food which he should eat in order to maintain growth and normal development. The parents, particularly the mothers, plan for the time which the boy spends out of school and these hours must be arranged in accordance with the activities of the school program. Most day schools begin at eighty-thirty in the morning and last until four or five-thirty in the afternoon, depending upon the age of the boy. This means that practically all of his waking hours during five days in the week are spent in school. Parents must recognize this and plan other activities so that they do not conflict with the school program or overtax the boy's mental or physical ability. Unless this is borne in mind, fatigue is sure to result with its consequent ill health—nervous exhaustion or physical disease. Both the school-masters and the parents must recognize the fact that

the younger children cannot either work or play for as long a period as the older children, and all of them very much less than the adult. If it is desirable for a boy to do special work in French, music, or in any other subject, the time given to these things must be adjusted by a relaxation of work at school. Certainly they should not be added in addition to a program which already contains all the mental effort which the child should give in the twenty-four hours of any day. If home lessons are required, as they must be with the older children, the parents must recognize that other activities must be done away with or must be reduced to a minimum so that the proportion of work in the child's day will still be kept within his ability to perform it without undue fatigue. In this connection also it should be borne in mind that the week-ends are primarily intended as periods of relaxation and rest and that they should not be filled by parents with extra work, nor should the school authorities infringe upon them for additional scholastic requirements. Nothing must be allowed to interfere with the proper amount of sleep, and for the younger boys rest periods should be provided in the middle of the day.

One of the most important factors in the satisfactory carrying out of the school program is the regularity of attendance. The two main causes for irregularity in attendance in a country day school are illness and voluntary absence due to late entrance to school in the fall and early leaving of school in the summer and the taking of extra time on afternoons and at week-ends. These voluntary absences should be entirely eliminated. Parents should realize that it is not fair to place their children at a disadvantage by allowing absences without a real cause. Absences due to illness can also be reduced very materially over the usual number, provided attention is paid to the matter and real cooperation is secured between parents and school. It is probable that there will always be more absences from this cause in day schools than in boarding schools because of the constant contacts with sources of infection outside the school.

Quarantine for exposure to infection frequently involves more days of absence from school than would result from allowing the child to have the disease. In the case of German measles, chicken-pox and mumps for children under ten years of age such quarantine might well be omitted. Small-pox rarely occurs because of the general practice of vaccination. Private schools should require this as

the public schools do. Diphtheria need never occur if immunization with toxin antitoxin is also demanded of all children before entrance. In the presence of exposure to scarlet fever the children with a negative Dick test may with reasonable safety be allowed to attend school without quarantine. Those with a positive Dick test must be considered separately and disposition of them made in accordance with the recommendations of the physician in charge. It is a question whether or not all children should be immunized against typhoid fever. Certainly the school should not employ any person in connection with the kitchen who has not been proved not to be a carrier of the disease. Measles in the present state of our knowledge cannot be excluded from schools and epidemics are bound to occur. Whooping cough can be controlled to a considerable extent by the early and vigorous use of vaccines. Respiratory infections are the most important cause of absence due to illness, and we are not able to recommend any procedure which will prevent their occurrence. They can be considerably reduced, however, if parents are willing to recognize the fact that colds are contagious in the early stage, and that they are more quickly cured by rest in bed and treatment at that stage of the disease.

Athletics require mention. They are frequently supervised by college boys or recent graduates who do not have an appreciation of the bad effects of over-fatigue in children, particularly children of the younger ages. The athletic schedule is often too strenuous for the physical capacity of the children.

It is often necessary to make special arrangements for certain children who need corrective work for faulty posture, or extra food and rest for malnutrition. This can be provided best within the school hours as a part of the school program. The results are much more satisfactory if the children are treated in groups. It is justifiable for the school to make an additional charge for these classes. The question at once arises. What shall be done with the child who has a handicap or who for some reason is unable to do the usual amount of school work? This is a matter of general school policy. Many schools definitely take the position that any child who is unable to carry the full schedule must leave the school. This undoubtedly makes the running of the school easier but it does not help the child who is sent away. I believe that there should be

enough flexibility of program so that any child, unless he is obviously mentally deficient, can carry on in the school with such special provision as his individual case requires

The third feature in health supervision is the physical care of the children—the strictly medical part of the school work. Every day school should have a school physician who is paid a definite salary and who is expected to perform definite duties. What these duties are requires some consideration. One is at once concerned with his relation to the family physician and to the parents of the children. I am inclined to believe that we have depended too much upon what the school physician does in the way of physical examination of the children and too little upon his direction of the other features of the school which have a definite bearing upon the health of the boys. May I state my own conviction in this matter? I recognize that it is not the universal opinion nor is it in line with the general practice of country day schools. I believe that the general health supervision of the boy should remain in the hands of the family physician and that the parents with his advice should assume full responsibility for what the boy is able to do. This means that the school physician should be concerned with the health of the boys in the school as a group, and be responsible for the details of individual health only so far as the work of the school is concerned. Each boy should have at school an examination by the school physician in order to determine his fitness to perform the usual school requirements of study and exercise, to discover any limiting condition which might require treatment or to exclude any boys who present evidences of disease which might be detrimental to other children. The complete physical examination which forms the basis for advice to the family should always be made with a parent present and the full twenty-four-hour time of the boy discussed and approved or modified in accordance with the circumstances. This cannot be done within the limit of time of the school examination. The findings of the school examination should be reported to the family and any suggestions for treatment made to them, or better reported and discussed with the family physician. Modification of the school program for the boy may be made as a result of this consultation or arrangement made in the school hours for corrective work. The connection of the boy and his

parents with the family physician should be a continuous one, beginning with birth and extending through the whole period of growth and development. The life in any particular school is only a small part of a boy's life and should not interrupt the permanent health supervision.

If the school physician gives up certain features of his physical examination, he should also be expected to assume responsibilities in connection with the school which usually are not brought to his attention and in which he takes little or no interest. Of course, he should make and apply the rules for quarantine and return to school of those exposed or ill from contagious disease. He should also examine those who have been ill with scarlet fever, infectious skin diseases and perhaps some other conditions before they are allowed to mingle with other children. He should have general oversight of the athletics—his word must be law in relation to the forms of exercise to be given to the boys and of any modifications as applied to an individual boy. He should also plan and supervise any special treatment carried out at the school, such as posture classes. The whole school program should be reviewed by him to be sure that there is adequate provision for rest periods and that the schedule of study and exercise is within the capacity of the boys for whom it is planned. He should know that the food served to the boys is proper in kind and amount and free from the possibility of causing disease, this particularly in reference to milk and milk products. He should be assured that every teacher or employe of the school who has any connection with the boys is healthy and not a carrier of disease—as typhoid fever. Routine examination of the teachers and others should be required as regularly as the examination of the boys. This matter is usually given no consideration in a school health program. And finally he should approve the school plant and its equipment. You will see that I have described the school physician as a health officer rather than a medical examiner, and I believe that in a country day school where the boys live at home, this is his proper function.

Finally we come to health education. The actual instruction of pupils in regard to the community aspects of health and disease, the rules for healthy living and the application to the individual of our known knowledge of how to keep well may properly be done by the teachers. The school physician should be consulted, however, in

order that the content of the teaching may conform to present-day medical knowledge. It must be remembered that example is as important as precept. Much of the technic of this instruction has been developed recently and may be improved as greater experience is gained. Even what should be taught is not settled beyond the possibility of discussion.

Let me say in conclusion that this program as outlined can be accomplished only by establishing a proper point of view with reference to the health of the boy in parent, teacher, and school and family physicians. We come back again at the end to the point from which we started at the beginning to the need of cooperation between all the persons involved in the attempt to guide the child through the period from six to eighteen years of age so that he may not only be equipped by mental training to meet the problems which will confront him in adult life, but that he may also have a strong body with which he will be able to carry on the work of a business or professional career and a knowledge of how to preserve his health in order that he may remain an effective instrument for the completion of his service in the world.

CARING FOR THE HEALTH OF THE PREPARATORY SCHOOL STUDENT *

By S T NICHOLSON, JR., M.D

Physician in Chief, the Hill School, Pottstown, Pennsylvania

THE secondary schools have long recognized the importance of attention to the health of students, and in the past few years they have attempted to provide adequate personnel and equipment to safeguard the health of the student body. For some time it has been recognized that a hit-or-miss policy in this important phase in the life of youth is unfair. It is obvious that a headmaster or principal of a school cannot be the administrator, teacher, father confessor, physician and surgeon to a group of boys who are undergoing physical as well as mental training and development. If boys and girls are to get the most out of their lives, they must be fundamentally grounded in the essentials of a healthy body and mind. The three R's of school life must be recognized as a part of their training and not the whole.

Sick call in a school conducted by a teacher or even a nurse must be relegated to the practices of the past. Even under a trained eye, such conditions as the onset of appendicitis, pneumonia and contagious diseases may go undetected for too long a period. Old customs and habits, however, are difficult to uproot, but I venture the opinion that proper health supervision of the school-child will arrive more rapidly than those of us who are in daily contact with the school expect. The health of a school is a vital economic problem both from the viewpoint of time and money. Funds expended to protect the school community from disease are repaid by increased classroom attendance. Eliminating the soil of the seeds of disease in the young cannot help but mean a healthier coming generation. Selecting the army for the World War revealed an appalling number of unfits in the prime of life. It is therefore our duty to make every effort to rid the child of conditions that may handicap him in later life.

The Hill School of Pottstown, Penna, with a progressive and

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far-seeing Board of Trustees, made provisions to put into operation a modern medical department four years ago. The public schools for a longer time have given their student body better medical supervision than the private schools'

I will briefly outline the medical activities as practised at the Hill School, mentioning in sequence of importance the different phases, giving as much emphasis to each as time will permit. For the sake of brevity and emphasis I will divide the activities of the department into four divisions, namely

- (1) Hygiene and sanitation of the school community
- (2) Preventive medicine as applied to the individual and the community
 - (a) Medical supervision of athletic activity
- (3) Clinical care and technic
 - (a) Resident medical staff and equipment
 - (b) Consulting staff of physicians
- (4) (a) Correction of defects, physical and mental. The former in cooperation with the Department of Physical Education.
 - (b) Instruction and education in elementary biology, physiology and hygiene
 - (c) Mental hygiene

DIVISION I HYGIENE AND SANITATION OF THE SCHOOL COMMUNITY

A proper and adequate food supply. The supervision of selection and preparation of food. Menus for a week are sent to the Medical Director's office. In cooperation with the dietitian and business manager, foods containing plenty of vitamins, such as fresh fruits, fresh vegetables, milk, cream, butter, etc., are planned and insisted upon.

All food handlers are examined for typhoid fever, tuberculosis and the venereal diseases. Each year an average of five kitchen employes have been found infected with one of these diseases—syphilis, gonorrhœa and pulmonary tuberculosis being the chief offenders. Three times each week the milk and water supply for the community is subjected to meticulous laboratory examination. A close and friendly cooperation is maintained between the dairyman, the town water board and the School Medical Department.

A sanitary inspection of the school is made weekly, the hygiene

of the buildings as regards cleanliness of the kitchens, storehouses for food, ventilation of sleeping quarters and classrooms, cleanliness of athletic locker room, tuck shops and the swimming pool are carefully scrutinized

Furuncles, red flap and jock itch are preventable and are reduced to a negligible minimum with care, whereas before, so I have been informed, furuncles and red flap were so common that they were expected as part of football, baseball and other athletic training

At best, swimming pools are potentially dangerous With frequent changes of the water in a modernly equipped pool, guided by frequent bacteriological examinations of the water, transmission of infection by this means is reduced to a minimum Boys with respiratory infections, skin infections, and history of tendency to ear and sinus infections are forbidden this privilege

DIVISION 2 PREVENTIVE MEDICINE AS APPLIED TO THE INDIVIDUAL

Small-pox vaccination is a state requirement and is rigidly adhered to by the school Boys who fail to display a satisfactory scar from vaccination are re-vaccinated No other vaccinations are demanded except in cases of emergency or advisability

Inoculations for protection against typhoid fever are advised and administered if the parents wish They are required if the disease is present in locations from which the student comes

The Schick test with toxin-antitoxin immunization is resorted to in the contacts of cases exposed to diphtheria This is a requirement only to check an epidemic in the school Frequently it is done at the request of the parents

The Dick test for scarlet fever as well as the production of immunization to the disease is considered the same as described for diphtheria

Before a student is enrolled in the school a complete medical history is filled out by the parent stating the diseases the boy has had, his tendencies, weakness, etc A statement from the family physician accompanies this history to guide us until we have had the opportunity to make our own examination

The following information is obtained from the physician
(a) Condition of the heart, (b) response to physical effort, (c) history of rheumatic fever, (d) history of evidence of tuberculosis, (e)

history of frequent tonsillitis, (f) history of convulsions, (g) presence of hernia, (h) have you found anything in your examination that would justify a limitation of physical activities?

As early as possible after his arrival in the fall, a complete physical examination is made, including weight, height, state of nutrition, posture with photographs, ear, nose and throat with special attention to diseased tonsils and adenoids, eye, dental and laboratory examination.

The positive findings on these examinations are communicated to the parents and the home physicians with suggestions as to correction. Frequent check-up of positive conditions are made and if the medical progress of the boy is unsatisfactory and believed to be due to defects previously noted and ignored by the family after repeated suggestions, a request to withdraw the boy from the school is made.

There is a group of about twenty boys out of four hundred and thirty in our school who are evidently below par. They are underweight and their development is under normal. Out of this group of boys many of the school scholastic and disciplinary problems arise. As a general rule trouble is not directly due to the boy. His limitations have not been considered and this type of boy is trying to carry as heavy a load as the robust one with excessive reserve strength. Although little headway has been made to correct this as yet, I feel that something has been accomplished by recognizing this group and attempting to prevent an important phase, namely, the fatigue element. Rest and an extra amount of nutritious food such as milk, cod-liver oil when indicated and quartz light therapy has accomplished much to restore self-respect in the boy and the esteem of his teachers. It has recently been arranged that the Medical Department should interview and examine a boy before he is aware that he is wanted by the Discipline Committee or is a candidate for dismissal from the school. A square peg will not fit a round hole, and it is our duty to find these misfits. Medicine has already gone far to explain the incorrigible boy—so called.

Preventive medicine as applied to the community can be dismissed with a few words. Measures must vary with the community. In a community like ours where a large number of people live in close contact, control of epidemic diseases when once they are introduced is most difficult. An earnest attempt is made to ascertain

exposures to disease after vacations Week-end and school absences are reduced as much as possible When contagious diseases are introduced, large gatherings are abolished and other restrictive measures are resorted to that are familiar to you all

MEDICAL SUPERVISION OF ATHLETIC ACTIVITY

The Director of Physical Education cooperates fully with the Medical Department and he will not allow a boy to go into the major or other strenuous sports until the Medical Department approves The cases of burned-out athletes and collapses are rare in the school at present owing to this close cooperation and mutual understanding Boys who have just recovered from acute infections, especially tonsillitis and pharyngitis, are allowed only the lightest exercises until the Medical Department advises the Physical Department that the boy is ready for more strenuous work We have kept a few boys physically restrained for over a year after joint involvement following the above infections The importance of such a procedure is evident.

DIVISION 3 CLINICAL CARE AND TECHNIC

A well-equipped dispensary with adequate office hours is necessary Our dispensary is located in the basement of the hospital, easily accessible but away from the frequented paths, with an entrance separate from the hospital The dispensary is equipped to care for the types of conditions that are treated, such as colds, fractures, injuries, gastro-intestinal disturbances, etc An X-ray outfit, diathermia apparatus, quartz lamp, a small drug shop, dressing tables, etc, are maintained as a part of the dispensary equipment. One large and four smaller accessory rooms are adequate for our needs The dispensary visits and treatments have averaged four thousand five hundred per term of ten weeks in the past four years A clinical laboratory with a trained technician is also in the basement of the hospital for examination and study of the usual clinical material No hospital or medical service is worthy of the name without a well-equipped laboratory In fact the medical service of the Hill School is built around the laboratory Bacteriology, serology, animal inoculations, etc, are essential even in a medical service that is supposed to take care of a group of supposedly healthy boys

The hospital contains forty beds on three floors—twenty beds in

four wards, equipped with cubicles; ten beds in five rooms also equipped with cubicles, the remaining ten beds are in single rooms chiefly for isolated cases and infectious diseases, two sun-parlors, operating and sterilizing room, chart, treatment and supply rooms complete the equipment. In other words, a completely outfitted hospital is necessary, as you will see when the list of diseases treated in the school is given below. We have installed for observation window-panes that are supposed to admit the unaltered sun's rays.

The average hospital rate per term of ten weeks in numbers is approximately two hundred admissions. Many cases apparently not needing hospitalization are sent in to prevent a more protracted and serious illness. Even with this precaution our ratio of dispensary visits to hospital admissions remains well over twenty to one.

Personnel of Equipment—*Resident* Medical director, associate medical director or school physician, four nurses, laboratory technician, secretary.

Non-resident. Consulting surgeon, two internists, psychiatrist, dermatologist, eye specialist, ear, nose and throat specialist, orthopaedist and two dentists. Their function is of course evident.

In conversation with a physician, he wanted to know definitely the procedure in the event of the necessity of a major surgical interference as a matter of information, and he informed me that several physicians had inquired into this. Our procedure is as follows.

We will take appendicitis for illustration. During sick calls at hours immediately following breakfast, luncheon and just preceding dinner, a boy who complains of symptoms that would indicate appendicitis is put to bed in the hospital, examination is made, including physical, urine and blood. If his condition will allow an ambulance trip to Philadelphia (37 miles) he is sent to the service of the Consulting Surgeon. The parents have been communicated with in the meantime and permission for operation has been obtained or, in some instances, refused. Whether or not an operation is indicated, the boy is put under the care of the Consulting Surgeon. On the other hand, if emergencies arise in the school and there is not time enough to get him into Philadelphia, the school hospital is fully equipped for surgical operations and the Consulting Surgeon comes to us. The Headmaster leaves the handling of medical cases, especially of urgent nature, entirely to the School Medical Department.

DIVISION 4. CORRECTION OF DEFECTS

Most of the activities under this heading have been discussed previously and I will not repeat. For completeness, however, I will enumerate them.

(1) Advice is sent to the parents in regard to the correction of defects.

(2) The clinical record of the boy throughout the year gives valuable information and further evidence of the susceptibility to disease, the necessity of rest, the limitation or the expansion of the school schedule, the capabilities of the individual and the recognition of what their limitations should be.

Instruction in elementary biology, physiology and hygiene and the study of mental hygiene are only begun. These activities are planned for our department on a comprehensive scale for the next year. Instruction in hygiene must be a part of the school curriculum if we hope to succeed. Supervision of this teaching naturally falls to the Medical Department. We have tentatively planned to add a non-medical man to the faculty to teach "elementary science." To his classes will be added lectures and assignments by the medical staff—four lectures per week to groups of boys not exceeding thirty in number. The DeWitt Clinton High School in New York City has the most satisfactory plan for this teaching that has come to my attention.

Occasional lectures by a doctor to a large group of boys to my mind does more harm than good. The sex phase of life is the usual subject of these talks. They do no good and I am convinced that "sex" in no way should be emphasized. The subject should be treated along with many other subjects and incorporated in a comprehensive system of classes and lectures. Talks of this nature have only served to increase a boy's introspection and morbidity.

Mental hygiene at present cannot be dealt with successfully even as a subdivision of the Medical Department. We attempt to create this without success. It can be dealt with as an outgrowth of clinical medicine, for it is through clinical medicine that the boy's confidence is obtained. After all, every qualified teacher and preceptor of the young should be a "mental hygienist." The only information concerning this that I feel qualified to give is that with us, even with a

qualified M.D. as mental hygienist and with every effort not to brand him as such, the news leaked to the student body. The results need not be mentioned.

POSTURE

The correction of faulty posture is a difficult problem and many schemes and devices have been put into effect, generally without success. The following plan, however, has worked most satisfactorily with us.

We borrowed from the Department of Hygiene, Harvard University, a system of grading posture, namely, A.B.C.D. At the examination at the opening of school each boy is put in the group according to his defects. Photographs and shadowgraphs are taken. These impress the boy greatly and if he has a group D rating he is anxious to improve it. It is a question whether this feeling is due to real desire to improve his posture or the fact that his room-mate is rated in Class B. If a scheme for improving posture could be devised that would instill the spirit of contest equal to a football game, our problem would be well on its way. We try to show them that a strong relation exists between good posture and qualities bearing on character, efficiency, courage, personality, etc. Also that it is vastly more difficult to develop a strong, healthy and erect body after eighteen years of age than between the ages of fourteen and eighteen. Confidence in the person conducting this work is one half of the battle, and I know of no one better qualified than the Director of Physical Education, Mr. M. F. Sweeney, under whose jurisdiction this work comes.

DISEASES AND CONDITIONS FOUND IN A SECONDARY SCHOOL

GROUP OF BOYS

To repeat, there is an average yearly dispensary list of 15,000 with about 600 hospital cases. Seventy-eight per cent. of all the medical diseases and conditions are diseases of the respiratory tract, namely, the common cold which we designate for our record's sake as acute rhinitis, occasionally complicated with sinusitis, otitis media, bronchitis, tonsillitis, pharyngitis (catarrhal and follicular), influenza and pneumonia. About 5 per cent. of the total number are complicated with some of the above-named conditions. Pneumonia is 8 of 1 per cent. on the average (four-year estimate). Pulmonary and

glandular tuberculosis rarely (two known cases for the year 1926-1927) Diseases of the gastro-intestinal tract are practically limited to catarrhal jaundice, appendicitis and indiscretions in eating Five per cent. of the student body undergo appendectomies yearly

Allergic Diseases—Medical Diseases Hay fever, there are twenty-eight cases under treatment this year, asthma, three or four yearly (four-year average), blood, anæmia, secondary, ivy poisoning, the acute exanthemata, acute rheumatic fever, tonsillitis and endocarditis (acute and chronic), each year there is a group of about ten boys under close medical supervision with history and evidence of this condition, dentistry, occasional hypertension, two cases discovered yearly (four-year average)

"Fatigue" has been previously mentioned A great deal of attention is paid to this and is avoided as much as possible Little is said to the boy about it for fear that our attitude may be abused by some

Surgical Diseases Few herniotomies (two for the year 1926-1927), twenty appendectomies, twenty-six fractures approximately yearly, infections, skin wounds, furuncles, inflammation of cervical glands

CONCLUSIONS

I hesitate to infringe on your time by simply stating what is being done at a preparatory school for boys I am convinced that early manifestations of disease may be discovered in childhood and early adult life which, if properly brought to the individual's attention, may be corrected The diseases that attack the human body in middle and later life are rarely curable—they are palliated at best If the young can be spared the effects of scarlet fever, repeated infections in the tonsils and scores of other diseases which may leave lifelong traces we have done something worth while Drilling into their subconscious nature fundamentals of a healthy body and a healthy way to live is also part of our duty

I know that Utopia has not yet been reached and all pioneering movements are slow to get under way There is no progress if we let "well enough" alone and "well enough" in this sense is not "enough"

Medical History

MEDICINE FROM THE STANDPOINT OF HISTORY

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THE VALUE AND IMPORTANCE OF A STUDY OF THE HISTORY OF MEDICINE

DESIDERIUS ERASMUS of Rotterdam, that great scholar and humanist, had no marked affection for physicians. He called them "torturers and harpies" ¹ in one of his letters, and in his famous "Colloquies" he never let slip an opportunity of saying something disagreeable about the medical profession ². Nevertheless, when he was a young man of twenty-three ³ he wrote an "oration" in praise of medicine. This "Declamatio in Laudem Artis Medicæ" was first published in Louvain by Martens ⁴ and the date of the dedicatory epistle, which precedes it, is March 13, 1518. It is dedicated to a physician, Henry Afinius of Lierre, near Antwerp, and was apparently the *quid pro quo* for a present of silver cups. These cups were offered by Afinius, then chief physician of Antwerp, were accepted by Erasmus, and then never came. Erasmus, as he had already thanked the donor and had promised him, in return for his gift, the dedication of one of his more important works, was angry, and, in a letter to his friend Petrus Aegidius, said plainly what he thought of Afinius ⁵. However, Afinius seems to have sent the promised present after all, for Erasmus dedicated to him, not one of his greater works, but the little "Declamation in Praise of Medicine" ⁶ (See Frontispiece).

¹ Allen's "Erasmi Epistolæ," vol. 1, No. 285, p. 549.

² "The Colloquies of Desiderius Erasmus," translated by N. Bailey, London, Giffblings and Co., 1900. Cf. vol. i, "Courtesy in Saluting," p. 37, vol. ii, "Ichthyophagia," p. 254, vol. iii, "The Funeral," pp. 4-5.

³ "Ante annos viginti tres," Allen, *op. cit.*, vol. i, p. 18.

⁴ Cf. Allen, *op. cit.*, vol. iii, p. 253. Intro to Letter 790.

⁵ See "Desiderii Erasmi Roterodami Opera Omnia," ed. J. Clericus, Lugduni Batavorum, 1703-1706. App. 227 and 256.

⁶ See Allen, *op. cit.*, vol. ii, p. 492, Letter 542.

This "Declamatio" is little known. An English translation is said to exist⁷ but has, thus far, not been attainable. There is a German translation with notes⁸

After saying, in his dedication, that the Declamation was written at a period in his life when he "was trying his hand at everything," Erasmus begins in the usual rhetorical style of a Greek sophist. He is, it seems, addressing a gathering of medical men or of medical students⁹. After speaking of the high esteem in which medicine is held, he gives some reasons for this fact. He quotes from what he had read in Pliny the Elder's "Natural History" about the history of medicine. He cites a "case history" of Asklepiades, the famous Greek physician who practised in Rome in the last century before Christ, and tells, citing Pliny,¹⁰ how Asklepiades once restored a dead man to life. Then he takes a statement from pharmacological history¹¹ and mentions a plant, "hain," which is said to have restored life to a young man who had been killed by a poisonous snake.

In other words, in order to "speak in praise of the art of medicine," Erasmus is obliged to speak in terms of "Medical History." In order to show its present importance, he has to dwell on the glories of its past. He cannot tell what medicine is without describing what it *once was*. He cannot emphasize the present, or prophesy about the future without describing the past and trying to apply the lessons that it teaches.

After mentioning these somewhat extreme tales about the power of Asklepiades to raise the dead, he adds a very important sentence. For the medical historian, it is worth remembering

⁷ "Declamatio in laudem nobil medicinæ, translated into English. Impr. by me Robert Redman." Not in the Catalogue of the British Museum and not known to the great authority on Erasmus, Prof. Preserved Smith, of Cornell University.

⁸ "Lob der Heilkunst, Ein Vortrag des Disiderius Erasmus von Rotterdam, aus dem Lateinischen uebertragen und erläutert," von Prof. Dr. Ludwig Enthoven, Strassburg, Ed. Heitz, 1907.

⁹ Compare the sophistic book called "On the Art," in the Hippocratic Corpus Littré's "Oeuvres d'Hippocrate," vol. vi, pp. 1-27. Also "Die Apologie der Heilkunst. Eine griechische Sophistenrede," bearbeitet von Theodor Gomperz, Leipzig, Veit, 1910.

¹⁰ Hist. Nat., lib. vii, 124.

¹¹ Pliny, op. cit., xxv, 14.

"Neque vero laboraverim, si sint apud quos hæc fide careant Certe (quod agimus) admirationem Artis, tanto magis implent, quanto magis supra fidem veri sunt, et immensum esse fateri cogunt, id quod vero supersit."

["Now I shall not consider it of any importance if these facts that I have mentioned seem, to many, unworthy of belief The point I am trying to make is this, that the more they exceed the measure of belief, the more they fill us with an admiration for Medicine, and that even when one considers only the believable elements in them, the more they compel that same admiration"]

It is difficult to translate the pithy Latin, but the sense is plain enough The truth or the falsity of medical traditions is not of primary importance, the point is that the traditions, true or false, bear witness to the physical and mental activities of a group of human beings, who have stood out, always, in clean-cut prominence against the background of human life and society, as long as such life and society existed And even when you make allowances for error—even when you have tried to clear away the superstructure of legend and get down to the residual realities—even then the historical facts that remain are enough, in themselves, to maintain the reverence and admiration in which the art of medicine has always been held

Erasmus knew nothing about medicine—less, perhaps, about the canons of historical criticism—but he was, in his time, a great scholar as well as a great influence His tremendous power, as a leader of contemporary thought, came from his intimate contact with the past. It was because his mind was steeped in the life and thought of past ages that he understood and helped to mould the present.

Nowadays, we live so much, so entirely in the present, that we have come to despise, as waste material, everything that happened the day before yesterday This, perhaps, is more unfortunately true in the domain of medicine than in any other We physicians are like divers who stand at the very end of the diving board, and jump off here, instead of going back along the length of the thick plank that stretches behind us, and beginning the run for our dive into the future with an impetus that we can get only by retracing our steps back to the shore-end of the diving board, and starting from there

It is, unfortunately, only too true that what we call "The History of Medicine" has lost its power to interest our modern, hurrying

minds because the medical "history books" lack that "life-interest" or that "sex-stimulation" which we find and enjoy in the very same rough material of human life when moulded by some man or woman's imagination into a so-called "work of fiction." Yet, in reality, there is no end to the interesting and stimulating material that, down through the ages, has been heaped together by the lives and thoughts of our ancient colleagues.

Of course, there are various methods of writing medical history, various methods of teaching it, or of thinking it, or of studying it. Unfortunately, in one sense at least, there is only one way of reading it—you can read only one kind of medical history at a time, the only kind for you, at the moment, is the kind written by the man who compiled the first history that you hold, or try to hold, in your hands. And, if that kind be a dull kind, if it be a mere repetition of names and dates, a mere series of discoveries in anatomy or physiology, then, for you, medical history will be dull always, and it will take a most stimulating mental event in your life to change that deeply rooted idea.

All histories of medicine are dull, in places. People make the mistake of trying to read straight through a medical history, and they never get very far. A much more sensible method is to pick out some period of history that appeals to you. Every man has his likes and dislikes in connection with historical periods. What the basis of this is, it is hard to say. It need not be the doctrine of the transmigration of souls. Because I thrill at the description of the battle of Thermopylæ, or of Salamis, that need not mean that, in some earlier incarnation, I was an Athenian hoplite. Or that because I feel fascinated by the times in which Dr. Richard Mead, that spoiled child of fortune, lived, I was myself one of those who envied him the possession of the Gold-headed Cane. But, be the basis of our interest what it may, each of us finds some period in history in which he seems to live more keenly than in others. Let him plot out his period chronologically, taking that useful old book, Ploetz's "Compendium of Ancient, Mediæval and Modern History," as a guide. Set out the earliest date at one end, the latest at the other, and then fill in, again from Ploetz, the most important

non-medical events, with their dates, that happened within the period. Then he can begin to read. Not necessarily, at first, a medical history of his little period. A better way to begin is to take some famous writer of fiction who wrote during that period. If you are interested in the later Græco-Roman history, take Lucian. If in early Victorian, take Thackeray. And, as you read, note down, in pencil, on the blank leaves at the back of your book, every page on which there is any reference to medicine or to physicians. You will begin then to get the "flavor" of your period. Then, you can go to the histories of medicine and get what they say about your own little space of time. Here you will have a wide range of choice, for the French write the history of medicine one way, the Germans another and the English, another still. I have seen only one attempt to write it in an American way, and in what Mr. Mencken calls "American speech." But that attempt was, decidedly, not a success. There are, of course, American historians who write from the French point of view. Also Americans or English writing from the German standpoint. Then, there are certain histories that you will need as reference books, in which you will find inexhaustible stores of knowledge and references. Of this type are Haeslers' three volumes in German, Neuberger-Pagel, also in three volumes, and Colonel Garrison's one volume in English. A good example of the French School, in English, is the new "History of Medicine" by Doctor Cumston. He is more interested in what physicians have thought and taught than in what they have been—more interested in medical minds than in entire medical personalities. As for the English, Doctor Singer's little book on Greek biology and Greek medicine is an excellent proof of how a great scholar can write simply and clearly the outline of a period without too much elaboration or detail.

If a man will, in this way, gradually work his way into some period of medical history, he will find it interesting enough.

Moreover, nowadays, the history of medicine has become greatly enriched through the discoveries of archæology. In no period, except during the Renaissance, have there been greater archæological discoveries made than during the past fifty years. In many ways, we know more to-day about the life of Athens and Rome than the people knew who lived only three hundred years after the most glorious

periods of these two glorious cities. It shortens the span of the ages when I can put into your hands the instruments used by a physician who lived in Asia Minor in the first Christian century, a physician who might, quite possibly, have met and known St. Luke. Especially when you note that his catheter was of almost the same shape and size as the metal catheters that you used yourself, during your first clinical training some twenty years ago. Or, when you see the little scales that he used to weigh out his drugs and his surgical hooks to hold open a wound. Or as you hold in your hands a bit of papyrus—with the Greek letters on it still decipherable—as an old Alexandrian colleague of yours wrote them, when he in the early Christian centuries was sending in a report to one of the police authorities on the case of a man that he, the physician, had found hanged, a suicide.

For, in medical history, we are no longer interested exclusively in what physicians thought, what they discovered, or simply in what they taught and wrote. The domain of medical history includes nowadays the entire lives, from birth-day to death-day, of every physician who has ever existed. We are interested not only in Harvey's discovery of the circulation of the blood, we are interested in Harvey as a man, as a personality, living in and reacting to a definite environment. A man in whose long life his great discovery was only a very small, and perhaps to himself a comparatively unimportant, event. And because, nowadays, we are in a position to know so much more about the lives of "Our Fathers of Old," because we can come so much closer to their struggles and their successes, because they can, if we will, become to us living, interesting personalities, because of all this, the history of medicine is not, and ought never to become a mere recital of names and dates and discoveries. A record of objective medical thought rather than a record of warm-blooded interesting medical life and work.

But there is a more important reason why we should teach the history of medicine in our medical schools, and why, if it was not taught there when we graduated, we should do what we can to supply the defect.

In the first place, the history of medicine is an integral part of

our medical heritage To allow a young student to finish his course without any knowledge of the history of his future profession is to deprive him, unjustly, of a part of the heritage to which he is entitled

But there is still another reason for historical study As both Professor Sudhoff and his distinguished pupil, Professor Sigerist, have said "The importance of the study of the history of medicine lies in this By it we reach some understanding of the present, and have some chance of predicting the future" From the past we may deduce the future and get a deeper understanding of the present In other words, we must learn to think historically

For in the development of medicine in each and all of the great civilizations of the world, there seems to be a certain, definite, progression, and medicine passes, along definite lines, from one stage to another

I am not referring to the well-worn method of so many medical historians, who divide the entire history of medicine into a certain set of periods, each writer making different divisions and criticizing his colleagues for not accepting his own particular arrangement.¹²

Such divisions are purely subjective reactions, they teach no important historical lesson But it is a far more important matter, if, within the scope of every important civilization, Egyptian, Babylonian, Græco-Roman or European, we find that medicine tends to develop in a series of periods or states that succeed one another in the same order and that show, roughly, in each civilization, the same outstanding characteristics If this be true then we have learned something definite from the past that may safely be applied to the present, as well as to the future, of our profession We may ask ourselves, to-day, what period have we reached in this same development, and what, according to the lessons of the past, ought to be the period upon which we are about to enter! Are we standing, to day, in times of new and great discoveries, of fresh, fruitful application of discoveries already made to unsolved problems, or, are we living really in an age of medical decadence, when we have used up and have thought out all that has been discovered, and are waiting on the

¹² See "Histoire des Sciences Medicales," par Charles Daremberg, Paris, 1870, vol i, pp 25-27 and pp 32-65

threshold of something as new and undreamed of as the anatomy of Vesalius was to the Galenists of his generation!

Of course, there is in medicine one element that does not change, one thing that is the same to-day as it was in the days of Hippocrates. It was Hippocrates, you will remember, and the School of Cos, who insisted on the fact that medicine was not a science that might be mastered by any one who took time enough to study it, but an art that could be acquired only by those who were, by nature, endowed with the gifts of mind and temperament, which, then as now, go to the making of a good practising physician, a healer of the sick. This "art" of medical practice remains, more or less, always the same. In this sense, a good physician, in any period, and at any time, is "born, not made." But it is medicine as a science that varies, that develops, and that develops, within the boundaries of every civilization, in a definite, most instructive manner.

For the clearest statement of this periodicity in the history of medicine, I am indebted to a lecture by Prof. Henry E. Sigerist, of Leipzig, the lecture that he delivered on the taking over, from Professor Sudhoff, of the Chair of the History of Medicine at the University of Leipzig. Other historians have briefly sketched these periods. None, so far as I know, except Professor Sigerist, has linked them so closely and convincingly. He has been criticized for giving too much importance to the one subject of anatomy, but the manner in which he uses the history of anatomy as a sort of sign-post makes his demonstration all the more convincing.¹³

The history of medicine is the history of man's struggle against the surrounding forces of disintegration, against death, or at least against premature death. It is the history of the success he has achieved in finding protection against the hostile forces of nature.¹⁴ We look back to-day over some five thousand years of this struggle. It is not a continuous development. There is no one single, guiding thread that runs through the whole labyrinth. As in all history, progress does not move straight upwards along a straight line of achievement but it is more like a line moving in circles, upwards and

¹³ Lecture published in *Archiv für Geschichte der Medizin*, band xvii, Heft 1, pp. 1-19.

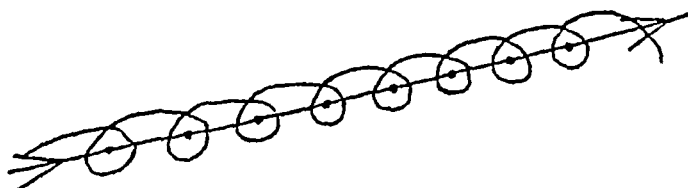
¹⁴ Cf. the well known passage from Dr. Oliver Wendell Holmes' "Medical Essays," Boston, 1883, pp. 278-279.

downwards, with the centre of each circle in the same straight, ascending line.

Not like this—



But more like this—



In all civilizations, then, the first period is that of folk medicine. This is an element that is *always* present, in every succeeding period, but varying in prominence. In this period, at the beginning of a civilization, the physician fulfills three functions. He is priest, magician and physician also. Therapeutics are on a purely empiric basis, if the illness be a mild one. If it be severe, it may be treated by magic or by religious rites. If by magic, then the illness that has been "wished on" the patient by some other man, must be magically removed back to its sender. If it be an illness sent from some divine power, then religious rites must be used. For this divine author of the disease may be a malignant spirit, who sends the illness as a vengeance (*e g*, the Babylonian Disease Demons), or a good spirit, a god himself or one of the old or of the newly dead, who sends sickness as righteous punishment or as a trial of faith¹⁵. The method of diagnosis is simply to find out, by some divine ordeal, by omens, or dreams, the human enemy, the evil demon or the good spirit and then to remove its activity.

The second period is the period of the assimilation of foreign medicine, or medical teaching. This is more clearly marked in our own civilization than in others, at the present state of our knowledge.

A new people, with its own primitive or folk medicine, comes into contact with the highly organized medical system of a decadent period. As the Teutonic and other tribes overrunning the Western

¹⁵ Cf. Plato, "Phaedrus," Sec 244, A, line 7 following

Roman Empire came into contact with Græco-Roman medicine. Or, we find a better example still, in the process by which the remnants of Greek medicine, that had been assimilated by the Arabs, partially from contact with the Nestorians in Persia, were brought into Europe through the translations into Latin of Constantinus Africanus in the eleventh century. This period is a sterile one. The old "thought form," as Doctor Sigerist calls it ("Denkform"), of the assimilated medical teaching has been exhausted, the assimilators have themselves discovered, as yet, no new one.

Thirdly, comes the period of scientific beginnings. A new "thought form" is discovered. As during the Renaissance, here are the first gropings after a new spirit, a new adaptation. And a break with the old tradition. Paracelsus broke, but he did not build, as Vesalius did, on a new objective foundation of anatomical discovery. And Sigerist calls attention to the significant fact that, in the same year (1543) in which the "*De Fabrica*" appeared, Copernicus described his heliocentric system of the universe. In Greek medicine we find these same characteristics in the pre-Hippocratic period, when medicine was working itself free from philosophy and founding a new science of its own.

The fourth period is the period of new ideas, of great minds, all stimulated by the discovery at the end of the preceding period of a new thought form. Sigerist calls it the period of blossoming ("*Zeit der Blüte*") It never lasts very long, as the circumstances that produce it are transient. In Egypt it corresponds to the period of the middle kingdom, in which the specialized medical treatises were written, that were later condensed into the "*Hermaneutic Medical Handbooks*." In Greece, naturally, it is the time of Hippocrates and his immediate pupils.

Fifthly, comes a period in which the new ideas, the new thought form is developed and applied. We find no fresh, great, creative ideas but many practical applications, many discoveries, based on the achievements of the preceding period. All the natural sciences are brought to bear upon medicine, and become her handmaidens. And, in medicine, the mechanical successes, in surgery, in therapeutics, are very prominent. This period is usually associated with great cities. As it was with Alexandria and with Rome. In Greek medicine, it corresponds with the Alexandrian period. It is a time

in which medicine becomes split up into schools and sects. There are no great writers but there are many commentaries written on the ancient ones. Sigerist finds this period, in our own civilization, not in the first half of the nineteenth century with Virchow, Koch and Pasteur, but in the Barocco period, the seventeenth to eighteenth centuries. For then, he says, we watch the final triumph of the anatomical "thought form," in Leuwenhock's microscope, in Harvey's discovery, in Haller's theory of "function." Morgagni, 1761, studies symptoms *inside* the body and associates them with the *organs*. From Morgagni's teaching of the impaired functions of the organs as the cause of disease to Bichat's teaching that the seat of disease lies in the tissue is but a short step. In the seventeenth to eighteenth centuries also we find the other sciences associated with medicine, *e g*, chemistry through Boerhaave.

By the beginning of the nineteenth century our European medicine, in its fundamental thought form and its applications, is complete. There have been, according to Sigerist, no definitely new ideas. Our discoveries are all merely applications or developments of what has been achieved in preceding periods.

The sixth and last period is the period of decadence. In order to mask a possible "de te fabula" Sigerist discusses the characteristics of this period, in terms of Roman medicine at the time of Galen and during the following century. During this period, so far as externals go, everything in medicine looks flourishing. The physician holds a high important social position, there are great hospitals, the state busies itself with the health of its people, there are sick benefits and state control of such things as the purity of drugs. Among physicians, there is an immense amount of *publication*. Nearly everyone who is anybody writes something or other. It is a period of medical handbooks that contain "medicine in its entirety" as a complete, rounded system. Medicine is now "an exact science." Patients who do not like hospitals have all sorts of sanatoria, or baths, and health resorts. Sports are popular, there is great enthusiasm for all forms of athletics, but the ordinary man and woman is less and less inclined to take part in such contests themselves. They prefer to pay highly trained athletes to play their games, while they, themselves, look on. Athletics are commercialized, have become activities for professionals. While medicine itself has grown so special-

ized that there is a physician for every part of the body. The same thing had happened in Egypt, during the parallel Egyptian period, as Herodotus¹⁶ tells us. In Rome, in Galen's time and later, the whole teaching material of medicine—the entire system as then taught and practised—had grown too large, too unwieldy. It was almost impossible for a young man to master it all. At this same period of decadence, in Rome, religious or primitive medicine pushes its way once more to the front. There are all kinds of new gods, of new temples. The temples of Asclepius become the centre of a sort of suggestive mental treatment, combined with hydrotherapy and exercise, that is immensely popular.¹⁷

In attempting to reconstruct for oneself this sixth period of so-called decadence, one cannot help feeling somewhat at home in it. It is, in so many ways, so much like our own times.

And so, one cannot help asking: Are we, to-day, living, so far as medicine is concerned, in a period of decadence? Is it true, as Sigerist says, that, in medical history, each civilization has only one primal "thought form" and when that thought form is thought out then sterility and useless repetition and readjustment set in, until some new thought form is discovered!

Is the so-called "anatomical thought form" of our European medicine "thought out"! Are we standing, to-day, on the verge of a new era, when something else unexpected, undreamed of, is to take its place?

Sometimes one thinks that this may, indeed, be so. Ten years ago, the physicist, or even the chemist, would boast to you that his science was an exact science, that it had all been thought out, and plotted out, that he had it, as it were, "all shut up in a box." And yet to-day the physicist will tell you quite another story, that he is really only at the very beginning of things, that, only now at last, he is breaking the old boundaries and getting at least some slight vision of "reality." Even of such "real" things as time and space he is no longer sure. They may be one and the same thing.

Is something of this kind coming to medicine also?

Whether it comes or not, the realization that it may come, that

¹⁶ Book ii, sec. 84.

¹⁷ See "Marius, the Epicurean," Walter Pater, vol. i, Chap. III, and description of Marius' "Cure" in the temple.

according to the experience of past ages its coming is far from improbable, gives us broader outlook, wider vision, makes us less cock-sure of ourselves, more humble-minded, and therefore wiser, better servants of suffering mankind

If the study of the history of medicine serves, even in some slight way, to such an end, surely it is justified in the eyes of all medical men who love and who are proud of their profession.

And if you are proud of your profession, remember that, as Erasmus could not speak "*ad Laudem Artis Medicæ*" without talking about the history of medicine, so you, if your pride be worth anything, will find it well worth your while to build this pride on a firm foundation by keeping in touch with the past lives of those ancient colleagues of yours, from Babylon, from Egypt, from Arabia, from Greece and from Rome, who have handed down to you the treasures of the art and the science of medicine

Travel Clinics

THE AMERICAN HOSPITAL AT PARIS *

THE equipment at the American Hospital at Paris is practically equal to anything in the United States. Everything but a Victor Buckey table is of foreign make. An upright fluoroscope is equipped to take six small films (6 by 8) of the gastro-intestinal tract as soon as the proper filling is observed on the screen. The films are protected by leaden boxes which are attached to the sides of the screen. This table is similar to the Caldwell table used in the United States, but lacks protection from secondary rays. At Paris they have another fluoroscopic table which tilts laterally or permits of the Trendelenburg position under the quick action of a hand screw. A deep therapy tube is oil-immersed and suspended above the patient. He lies on an all-steel table beneath the tube. The current is generated by step-up coils and condensers. It is not produced by transformers and converters as it is in the United States. Large valve tubes are employed. Details in the films which were shown the visitors were excellent. A separate well-insulated X-ray apparatus is in a very large room. Either outfit can be used. It is well worth any one's while to visit this place and to inspect the installation, which is new and probably the best in Paris. The professor in charge speaks excellent English.

THE RADIOLOGICAL INSTITUTE OF THE POLICLINICO AT ROME*

DOCTOR NUOLI showed the visitors the Radiological Institute of the Policlinico. (He speaks French well, but little English. Professor Busi speaks no English.) Figs 1-11 are reproduced, with the kind permission of Professor Busi, as examples of the excellent work done at the Radiological Institute of the Policlinico at Rome.

The X-ray apparatus was of Italian manufacture with several Brody-Buckey diaphragms. A Buckey diaphragm in one of the medical pavillions had been manufactured at Milan. I doubt that

* Reported by Doctor Faure.

this installation is as good as those used in the better American hospitals. The Institute has but 220 milligrams of radium at its command. The demonstration rooms are large, as the Institute serves for a place of instruction. They are equipped with projection lanterns, and house exhibits and slides, reducing apparatus, etc.

There are separate research rooms, a large machine shop for repairs and building of new apparatus. An excellent library contains both valuable books and current journals of all languages. They show evidence of much use. Much stereoptic work is done and films are often placed side by side on a large illuminator and viewed by a small hand prism to get the stereo effect. To me this was not a satisfactory method. It was stated at the Institute that they have a large Wheatstone stereoscope which we did not see. The only work which was shown was three sets of apparently selected detail of calcified pleura, osteosarcoma of the skull and a gastrointestinal case. These films were far superior to those shown in the surgery and the medical pavilions, which I think represent their usual work.

Gas tubes are used for picture work and what appeared to be a water-cooled modification of a Coolidge tube for therapy. Each of the departments of the hospital has its individual X-ray department on a smaller scale. The statement was made that they fluoroscope with $1\frac{1}{2}$ milliamperes of current. For skin therapy the variable filtrate method of Francesco Ghilarducci is used. A reprint giving details of this method was presented to each physician attending.

In the various surgical and medical clinics films of only ordinary detail were shown, several were poor. Echinococcus cysts of the lung are common, often multiple, and some quite small.

One film of a bullet which had entered the interior vena cava was shown. It had passed the right auricle and entered the left ventricle, where it has remained for ten years without causing trouble. This fact was clearly shown by the electrocardiograph. Under the fluoroscope the bullet moves in a circular path within the ventricle.

Other films of gall-bladders were presented. The organ was made visible by ingestion of 10 gm sodium bromide with 150 cc water flavored with orange. The film is placed in the customary position eight hours after the bromide has been given. The patient

FIG 1



Gall-stones and cholecystitis in crustata before operation (See also Fig 2)

Fig 2



Skiagraph of gall stones and cholecystitis incrustata after removal of gall bladder (See Fig 1)

FIG. 3.



Solitary gull-stone viewed from various angles (See also Figs 4 5 6 and 7)

FIG. 4.

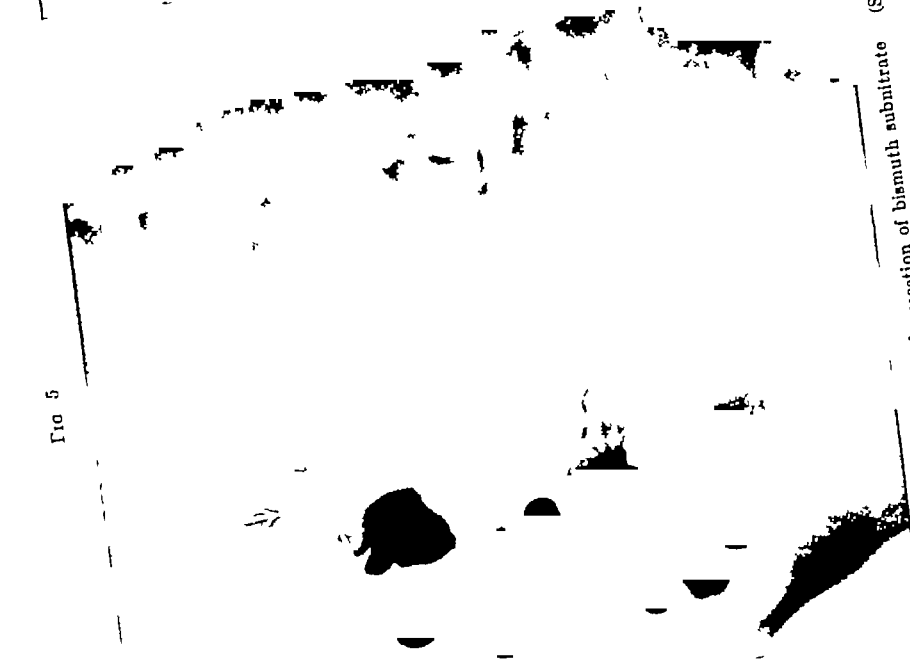


Solitary gull-stone viewed from various angles after the administration of a test meal (See also Figs 3 5 and 6)

FIG 5



Solitary gall stone (See also Figs 3 4 and 5)



Solitary gall stone seen after high injection of bismuth subnitrate (See also Figs 3 4 and 5)

Fig 7



Solitary gall-stone X rayed after removal from body (See also Figs 3 4 5 and 6)

FIG 8



Cranial recession with sinusitis (See also Figs 9 10 and 11)

FIG 9



Cranial recession with sinusitis (See also Figs 8 10 and 11)

FIG 10



Cranial recession with sinusitis (See also Figs 8 9 and 11)

FIG 11



Cranial recession with sinusitis (See also Figs 8, 9 and 10)

is placed on a preparatory liquid diet for several days and an enema given shortly before the bromide is administered. Visualization is only half as good as that obtained by tetraiodophenolphthalein salts.

One of the demonstrations was a congenital duodenal diverticulum. No symptoms or operation were reported. Furthermore there was a film of a very large branched kidney calculus, several films of a case of acromegaly showing destruction of the sella turcica and ten years later partial calcification of the sella. This patient had been given several series of deep Röntgen-ray treatment and the disease was brought to a standstill. For several years there has been no change.

A case of testicular sarcoma showed multiple metastases in the lung. It was a typical case for us, but caused confusion at the Roman institute, for the resemblance which multiple echinococcic cyst affords.

ITALIAN TRIP OF THE PÆDIATRIC GROUP *

A group of pædiatricians visited children's clinics at the Policlinico, Rome, the Ospedale Bambino Gesù, the Janiculum of Rome, the children's hospitals at Florence, and at Pisa, which latter is connected with the general hospital of the university, the Gozzadini Children's Hospital at Bologna, and the Children's Hospital connected with the University of Padua, the oldest of its kind in Europe, between May 17 and 27, 1926.

AT THE POLICLINICO, ROME, MAY 17, 1926

The children's ward of the Policlinico in Rome is an excellent building, two stories high, which has been newly constructed with additions nearly completed. It has about 200 beds. Everything is very modern, clean white walls, ceilings and floors, patients, bed linen, and everything concerned are neat and clean. It contains the usual rooms for out-patients. There is a well-equipped X-ray room and extensive laboratories, but no quartz lamps. There were provisions for mothers of nursing infants to stay for some time. Otherwise contact with parents is limited to two visits of one hour each week, except for emergencies. No cases were shown except those which were under treatment in the dispensary.

* Reported by Henry E. Irish, M.D.

The records in the clinics are brief and contained in bound books, which is conducive to preservation but not to full description of detail.

Infants are weighed on a scale made by Fabricio Invernizzio, Rome, the price of which is \$24. The scales are very compact, with the pan above, enclosed bars with sliding weights. It takes little space, cannot tip over, it is not a spring scale. We found this type in use quite generally in Europe.

Various cases of routine interest were demonstrated.

On Tuesday, May 18th, a group of the physicians went to the children's department, and met Prof. Francesca Valagussa, who speaks only Italian in lectures, but who understands some English, and uses it in conversation. An excellent interpreter was present.

A case of meningo-encephalitis was shown, which had recovered. The diagnosis had been made upon the usual symptoms of meningitis, there was nothing to indicate an encephalitis, except diminished intelligence. The cerebrospinal fluid was clear under pressure. The white-cell count amounted to 8 per c.c., no bacteria were found. The treatment consisted of administration of a 40 per cent solution of urotropin, a preparation manufactured by Schering, Berlin. It was given intravenously in doses of 1 c.c. twice a day, and also intraspinally in doses which were not stated.

The reporting physician remarks that the antiseptic value of urotropin in neutral alkaline solutions has been denied repeatedly.

A case of pulmonary tuberculosis in an infant, one month of age, was presented. Sputum examinations were positive, and numerous papulonecrotic tuberculids were demonstrated. The child had been separated from its tuberculous mother eleven days after birth, and was kept in the Preventorium. This isolation evidently was too late.

AT THE OSPIDAL BAMBINO GESU, MAY 19, 1926

The Ospidal Bambino Gesu (Hospital of the Infant Jesus) lies on the Janiculum, one of the seven hills of Rome. This hospital constitutes a collection of one- and two-story buildings in the midst of gardens, surrounded by a wall. The stone and stucco structure has been renovated. The interior is not modern as to drainage and lighting. It is clean from endless scrubbing, and reflects poverty of funds and patients. Excellent work is done here at a place where

it is much needed. It is wholly worthy of the contributions of the altruistic. There are 300 beds in this institution, and 120 more at San Mareno, 60 miles away on the seashore.

The management of cases follows a usual routine with four days of observation before the patients are sent to the wards for treatment. An attempt to prevent spread of infection is made by suspending sheets between the beds. No fly screens are used, but partial and complete glass cubicles in the typhoid ward where flies are active.

One of the outstanding cases was (so-called) congenital elephantiasis of the right leg and foot. An enormous first and second toe with atrophy of the remaining three toes hindered walking, but did not prevent it entirely. It was proposed to treat this case by plastic surgery. The attending physician was in favor of amputation.

A congenital anomaly of both ears was seen in a child, female, aged three years, called the "four-ear child." The deformity was due to delayed closure of the branchial cleft with chondrization of the anterior segments on the posterior part of the cheeks. The lower mandible was atrophied with resultant "over-shot" malocclusion of the jaws.

An enormous malarial spleen, which had defied treatment of all variants of quinine, was presented. There was a syphilitic hepatitis and splenitis, with ascites, anasarca, jaundice, Hutchinson teeth, now showing a retrogression. It had been entirely resistant to mercury, the iodides, and arsenicals, intravenously. This resistance in a boy, aged seven, prompted the comment by the demonstrating physician that congenital visceral syphilis was almost impossible to cure.

On the 19th of May a visit was made to the Preventorium, with Professor Valagussa in charge.

Here a unique medical and social blend of endeavor is in operation. Infants, separated from known tuberculous mothers during the first fifteen days of life, are nursed by unmarried mothers, who also nurse their own children with supplemental feeding, who are housed here for one year. The tuberculosis contact child is kept here four years. It is tested by the von Pirquet method upon entrance, and then at intervals of three months. None are positive before three months of age, and about 3 per cent. show a positive reaction before the expiration of the first year. The death-rate amounts to 7 per

cent in the first year, 2 per cent of which are due to clinical tuberculosis. Those who are negative at four months of age generally remain so during the first year. Bovine and human tuberculin are used on each patient, and generally the reaction is the same, though one may be more severe than the other.

Pondorf, of Switzerland, has called attention to freedom from tuberculosis of scrofulous patients, and has suggested the simulation of a skin lesion by extensive scarification, and rubbing in of undiluted O T (Koch), or of Morro's ointment.

The object is to elicit the production of antibodies in order to guard the patient against later visceral tuberculosis.

Professor Valagussa showed a negative case, and another with massive indurated erythema two inches (5 cm) by one (2½ cm.) He repeats his procedure every three months and has no febrile reactions, as has been seen in the Mantoux. Care is taken not to scarify deep enough to produce flow of blood.

AT FLORENCE, MAY 21, 1926

This hospital is an excellent institution for the care of children. In the absence of Prof C Comba, Anna Meyer welcomed us. Dr B Frambatti showed us the material. He is assistant editor of the *Rivista di Clinica Pediatrica*, published in Florence. It produced the impression of adequate equipment and up-to-date treatment. This impression was increased with each demonstration.

A case of empyema was being treated by aspiration of the pus, repeated as indicated. When pneumococcus was present, a solution of sodium taurocholate of varying low percentage was introduced to replace the fluid, which had been withdrawn. This procedure was based on a demonstration of a specific bacteriocide effect of the salt upon pneumococcus *in vitro*. (The reporting physician remarks that it will be recalled that pneumococcus empyema is more nearly self-healing with repeated aspirations alone.)

A case of Hodgkin's disease had been treated with absorption of the cervical masses. Six treatments of 2 ma for ten minutes, increasing, at 32 cm distance, were used, with an aluminum screen. By this, apparent cure had been produced. A prognosis, however, had predicted that the lesions might return.

A case of symmetrical gangrene of obscure etiology, involving a large part of the skin of both thighs and forearms, was healing slowly after four months in the hospital. An enormous thymus with dyspnoea was absorbed under routine X-ray treatment, and a splenic anaemia was improving under X-ray treatment, though the prognosis was doubtful of final cure

Doctor Frambasta was well pleased with the improved results upon obtaining pure cultures of *Bacillus diphtheriae*, with the Pergola medium published in 1923, in the *Annali d'Igiene*,¹ also in the *Revista di pediatria*.² It consists of a mixture of sodium telurite, egg-yolk, and glycerin. The colonies appear after twelve hours in the incubator, as black pearls, and are free from contaminating overgrowths

AT PISA, MAY 22, 1926

The University of Pisa has a large general hospital with a central garden, which is walled in. It comprises a children's hospital of 24 beds, which is not devoted to curative medicine, but is used for research problems. A new children's hospital, with 100 beds, in an outlying district of this city, is nearly completed.

Professor Fiori, in person, presented several cases which served certain research problems. Hygienic conditions were excellent, and the records and general methods of reporting are good.

The relation between various forms of fat and fat intolerance was disclosed. Some persons are intolerant to the fat of boiled cow's milk, and not to the fat contained in "Dryco." Olive oil was tolerated in certain instances where there was an intolerance to cow's milk. An elaborate chemical study of fat in stools in its various forms is being pursued.

Further investigations relate to thymus gland therapy, the effect of raw and cooked foods administered orally and hypodermically in cases of enlarged thymus. A few rare interesting cases had been chosen for demonstration.

The careful methods and absence of unwarranted enthusiasm exhibited here justify the anticipation of important contributions from Professor Fiori.

¹ P 453, No 8, July

² July, 1924, p 425

AT BOLOGNA, MAY 22, 1926

Bologna is a bustling modern city with wide streets. In it is the modern Gozzadini Children's Hospital. It is located in wide sunny grounds with foliage trees. It has 200 beds in five pavilions, with modern improvements and satisfactory isolation features. Professor Franceoni, with interpreter Joseph Henry Dilea, formerly of New York, presented anaphylactic reactions following diphtheria injections. He divided the reactions into the usual reactions about fifteen days after injection, and the less frequently occurring reactions after about six days. The early cases were divided into two classes, those who had previously been given antitoxin, and those whose mothers had been given antitoxin at some time in their lives. Curves showed that the largest number of reactions occurred on the sixth day. Figures upon which the conclusions were based were not presented.

Allergy, then, is transmissible from mother to child.

A variety of well-diagnosed and treated cases was shown, a Hodgkin's disease treated successfully with X-ray, an hereditary familial hemophilia with purpura of the skin, hemorrhage into the joints and soft tissues of the feet and legs on standing. One brother had died of hemophilia. There was no fever or tonsillitis, or inflammatory symptoms to confirm our suspicion of rheumatic purpura in a hemophilic. Further cases shown were a quartan malaria with a large spleen, a tuberculous bronchial adenitis with aphonia due to pressure on the recurrent laryngeal nerve. Aphonia was nearly complete. There was an arthritis of four months, with multiple large nodules, half an inch in diameter. This case had not improved on a variety of medical and physical therapy. A case of Oppenheim's, amyotonia congenita, a chronic epidemic meningitis, an acute and a chronic poliomyelitis, with a number of ordinary cases, gave us an interesting and instructive morning of solid and conservative information.

AT PADUA, MAY 27, 1926

At the University of Padua the oldest pædiatric hospital and clinics of Europe exist. They were founded in 1882. They were devoted solely to pædiatrics. Prof Guido Berghinz, somewhat

handicapped by inadequate interpretation, showed us a well-equipped but somewhat antiquated building

He presented cases of hemophilia, bacillary dysentery, treated with antitoxin, septicæmia from osteomyelitis, two cases of diphtheria, isolated from a general ward by glass screens only six feet high, a case of tetanus, and one of erysipelas. This last case was interesting in view of the statement made by Professor Berghinz, that the death-rate was only 5 per cent when treated with 10 cc once daily for ten or twelve days with erysipelas antitoxin from the Istituto Seroterapia at Milan, via Antonio (Lecchea). The death-rate from erysipelas in American children is much higher.

Pertussis was treated with vaccine, splenic anæmia with sodium cacodylate. A lumbar puncture for epidemic meningitis was performed with a patient in the sitting posture.

The record sheets were kept in a tiny wooden box over the bed, and babies under six months of age all wore a blue hood made of flannel to prevent colds.

The impression gleaned of the clinics was that a very large material was being handled in a way more suggestive of tradition than of modernism.

OPERATIONS BY PROFESSOR MARGARUCCI BEFORE THE INTERSTATE POST-GRADUATE ASSEMBLY AT ROME, ITALY

ON May 17, 1926 (9 A M - 12 30 P M), the following operations were performed

(1) Typical Bassini's method for the radical cure of inguinal hernia, with large excision of omentum affected with chronic omental hernia.

(2) A typical operation for the cure of inguinal hernia, combined methods of Bassini and Berger (strengthening of weak muscular layer with the anterior lamina of the sheath of the rectus abdominis). Both operations were performed under spinal anæsthesia (gr 0.10 eurocaine).

(3) Cholecystectomy for chronic cholecystitis in gall-bladder stones.

History—Married woman, aged sixty five, menstruation stopped at the age of forty. First typical gall stone attack at night six months ago, accom-

panied by diarrhœa. No vomiting, jaundice or temperature. For some weeks there had been nightly attacks with pain, radiating to the right shoulder. On admission the patient was in a feeble and anæmic condition, the gall bladder was palpable and tender. After some days of rest in bed it could no longer be felt. The X ray examination showed no alteration of the stomach, duodenum and other sections of the digestive apparatus, while it constantly and clearly showed the presence of a solitary stone in the gall bladder, the outlines of which were clearly distinguished.

Operation—Ether anæsthesia. Mayo Robson elevated position of the body. The abdomen was opened by a lateral oblique rectilinear incision. Extensive adhesions existed between omentum, duodenum, gastrocolic ligament and the gall bladder which, like the cystic duct, had thickened walls.

(1) The adhesions were separated, a solitary stone the size of an almond could be felt. The common and hepatic ducts were thin walled, not dilated and free from stones. The pancreas and other neighboring organs were normal.

(2) The gall bladder was detached from its bed, first on each side (Rio Branco), then at the fundus, neck and cystic duct.

(3) The cystic vessels were clamped.

(4) The cystic duct completely detached and ligated with catgut at $\frac{1}{2}$ cm from the gall bladder. An opening was made into the common duct at a right angle. The cystic duct was divided with the electric cautery.

(5) The cystic vessels were ligated. A small strip of iodoform gauze was left in the hepatic duct of the gall bladder and on the stump of the cystic duct. Suture of the incision in layers—peritoneum sheath of the rectus abdominis, subcutaneous (catgut) and skin (silk) leaving a small opening towards the middle for the gauze. Anatomical examination of the gall bladder at the point where it was opened showed the walls thick, the mucosa was not ulcerated and the content was liquid and deeply colored bile. A big stone of ovoid shape and granulous surface was found, it apparently was formed by salts and pigments.

(4) Cholecystectomy, choledochotomy, draining of the hepatic duct for gall-stones in the gall-bladder and common duct.

History—C. A., married woman, aged sixty six. Husband and three children affected with tuberculosis of the lungs. Since the age of thirty, the patient had suffered from gastric pains after meals, which are generally relieved by vomiting. For two months the attacks had become more intense and frequent. No hematemesis and melæna, no typical gall stone attacks or jaundice.

The patient was in bad condition, notwithstanding a certain stoutness. Hyperplasia of the upper part of the left lung, tenderness over the right hypochondrium and of the epigastrium. Enlargement of the liver. The gall-bladder could not be felt. The X ray examination showed the stomach, duodenum and colon to be normal, while it presented total opaqueness of the gall bladder.

Operation—Ether anæsthesia. Lateral oblique incision. The liver was found enlarged and hardened. The gall bladder could not be seen, as it was entirely covered by the liver. Adhesions of the omentum majus to the sides of the gall bladder could be exposed by lifting the right lobe of the liver. The

bladder was shaped like a cylinder, being of uniform size (of a thumb) from the fundus to the cystic duct, it was firmly implanted in the hepatic parenchyma.

The gall bladder felt very hard, as though it were filled out by a stone, over which it had been moulded. The cystic duct was very short (1 cm), just enough to ligate it.

The supraduodenal portion of the common duct was clearly visible, its walls were thick and dilated.

Cholecystectomy was followed by choledochotomy of the supraduodenal part of the duct, as stones were felt in its retroduodenal portion.

The detachment of the bladder was rather difficult. After the incision of the anterior wall of the common duct (1.5 cm) a large quantity of yellow bile escaped. Four stones of different sizes (from pea to bean size), brown and irregular, were removed. A T shaped rubber drain was left in the common duct while the remainder of the incision was sutured with catgut. The gall bladder bed was packed with gauze and three strips placed around the drain. Abdominal incision sutured in three layers.

Later Progress—Bile flowed from the drain. On the third day there were symptoms of intestinal paresis which apparently were relieved by hot-water bottles, enemata and injections of eserine. The symptoms of obstruction reappeared on the following day (the fourth) and required an enterostomy. Fetid, colorless fluid, very similar to the pus of a cold abscess, escaped through the incision of a dilated gut of the ileus. The peritoneum showed no signs of inflammation. The condition of the patient did not improve and two days later she died.

Dr A. Dionisi, professor of pathological anatomy, performed the *autopsy*. There were found: Hard adhesions in the pleuræ, myocarditis parenchymatosa, arteriosclerosis, enlarged liver, absence of gall bladder. Stomach very much dilated, containing about 500 c.c. of milky liquid of a foul odor. The dilated ileus contained the same fluid matter. No signs of recent peritonitis in the abdominal cavity.

The left kidney was atrophied in its centre, it had a big cyst full of a liquid very much like urine. The pathological diagnosis was that of "ileus paralyticus terminalis subsequent to gall stone bladder operation."

(5) *Right Salpingectomy*

History—F. S. Virgo, aged seventeen. Irregular menses since the age of fourteen. For the last twenty days, she had pain in the lower right quadrant of the abdomen. Patient in general good state of health. Pain on palpation of the right lower quadrant which is tender and slightly contracted.

A round swelling could be felt, which gradually receded into the pelvis. The rectal examination confirmed the presence of a swelling, the size of a big pear, its narrow pole was connected with the right side of the uterus, which was displaced toward the left. The swelling projected into the right antero-lateral pelvis.

The diagnosis lay between hydrosalpinx (possibly hematosalpinx) and intraligamentous cyst.

Operation—Ether anaesthesia. Trendelenburg position. Hypogastric inci-

sion of the midline The right salpinx is transformed into a pouch three times as large as an adult fist, shaped like a bagpipe, with very thin walls containing a pale liquid Few but strong adhesions toward the initial portion of the salpinx Right ovary contains a few small cysts Left appendages normal Salpingectomy was made on the right side Layer suture of the incision.

Afterwards a patient was shown who had been operated twelve days before "Definitive" craniectomy, for a malignant growth of the bone tissue not yet definitely identified by the histological findings, but which had been clinically and radiologically diagnosed as an osteosarcoma of the os frontale, squama temporalis and ala magna sphenoidalis (pars lateralis orbitæ) of the right side The patient has almost completely recovered

NOTES ON THE CASES OF GALL-STONE BLADDER

On Diagnosis—The diagnosis of the two cases of gall-stone has been strongly emphasized by the X-ray findings, which in both cases excluded any lesions of the digestive tract (stomach and duodenum), while in Case 2 the symptoms were rather in favor of such lesions (gastralgia after each meal)

The presence of a solitary gall-stone in Case 1 was shown not only by the shadow in the centre of the gall-bladder outline (clearly visible on the film) but also by the movements which followed the respiration motion and by the changes of their topographic connection, according to the various positions in which the X-ray examinations were made (patient standing or lying down, frontal or lateral position) These various findings were shown to the American surgeons by Doctor Meldohsi and Doctor Nuvoli, assistants of Professor Busi, Director of the X-ray Institute of the University of Rome In Case 2 the X-ray not only pointed out the existence of a stone in the gall-bladder but also a calcareous infiltration of its walls, which the radiologists, referring to a similar alteration of the bladder, called "cholecystitis incrustata"

Furthermore, the presence of a gall-stone in the common duct, which the X-ray examination indicated as very probable, was confirmed by the operation.

On Treatment—(a) In Case 1, the operation was limited to cholecystectomy with no drainage of the hepatic duct because there were no signs of inflammation of the ducts (thick walls—dilation) In Case 2 the incision of the common duct and subsequent drainage were necessitated because of the presence of gall-stones (four) in the retroduodenal portion of the duct.

(b) As regards the incision for operations on the liver, Professor Margarucci, after careful testing of many which have been proposed, believed that Mayo-Robson's lateral oblique incision slightly modified is the best. The slight modification concerns both the cutaneous incision and the division of the fibres of the rectus abdominis, as suggested by æsthetic consideration and the greatest possible preservation of the innervation of the rectus abdominis.

The skin incision is made rectilinear instead of angular, and the aponeurotic and insular layers underneath are divided in the following way

(i) The anterior lamina of the muscular sheath is divided by a rectilinear oblique incision which, like the cutaneous incision, begins on the linea alba 2 cm below the apex of ensiform cartilage and extends outward and downward parallel to the costal margin as far as the linea umbilicalis transversa.

(ii) The fibres of the rectus abdominis are divided by an obtuse angular incision, the superior branch following the direction of the cutaneous incision, the inferior descending vertically between the muscular fibres 1 cm inside the linea semilunaris as far as the linea umbilicalis transversa. By the incision, a free access is gained to the peritoneum which is incised like the skin. Extensive exposure of the region is thus provided, which permits the surgeon to work with the greatest ease and safety. The drainage is easily applied and the greater part of the rectus abdominis innervation is saved. The epigastric vessels are clamped and ligated before incision of the peritoneum is made.

(c) With reference to the drainage, after gall-stone operations, Professor Margarucci, notwithstanding all the reasons given for its abolishment, still uses it. From the point of view of his fairly extensive experience the reasons given for not relinquishing drainage have a purely technical value, since he has never observed the greatly lamented inconvenience due to the drain, *i.e.*, hernia, adhesions, causing new attacks of pain, pseudo-gall-stone attacks.

Only in a few cases has he been compelled to operate again, because of adhesions which were always found to be insignificant.

(d) The successful after-progress of Case 2 was the first instance of the kind observed by Professor Margarucci, who believes that it

was chiefly due to the very bad conditions of the patient and to the lack of bile flow into the intestine

On May 19, 1926, the following cases were operated on

CASE 1—C L, man, aged sixty three.

Diagnosis—Juxta pyloric ulcer

History—For ten years at variable intervals acid eructations, pyrosis, pain in the stomach after meals, relieved by vomiting In February, 1926, abundant melæna On admission General conditions good, tenderness on palpation of the epigastrium, duodenal point present.

The X ray examination showed a horizontal stomach, with adhesions to the inferior surface of the liver, deformation of the antrum, the stomach emptied quickly

Operation—Ether anaesthesia When the abdomen was opened an abnormal position of the viscera appeared. Instead of the stomach and transverse colon being covered by the gastrocolic ligament, the posterior layer of the transverse mesocolon was drawn upward.

The central part of the transverse colon was in a vertical position and to the right of the middle line, so that the mesocolon hid the stomach from view The omentum majus, matted and reduced to the shape of a hand, was directed upward, passing before the liver and fixing itself firmly on the centrum tendineum of the diaphragm to the right of the middle line Only after having divided the omental band between two ligatures could the transverse colon be replaced in its normal position and the walls of the stomach unfolded (The stomach was folded like the leaves of a book—partial volvulus) The initial portion of the duodenum showed signs of previous inflammation, with thickened walls

A posterior vertical transmesocolic gastro-enterostomy was performed.

Referring to the abnormal folding of the stomach, Professor Margarucci related a case of total volvulus of stomach and transverse colon which came under his observation a few months before

The patient had been taken to the hospital in a very bad condition, the symptoms came on after a very substantial meal on the previous day Symptoms of general peritonitis were present The operation showed the abdominal cavity full of foul gas under high pressure and of a solid putrid matter chiefly composed by food (beans) The stomach, enormously dilated, was rotated completely on its mesogastrium, dragging the transverse colon and spleen which was found, with its greater tuberosity lying against the gall-bladder On the posterior wall of stomach near the line of rotation a large gangrenous and perforated patch was found A similar perforation was to be seen on the transverse mesocolon. Through the stomach

perforation the gastric contents had escaped into the peritoneal cavity, causing a lethal peritonitis

CASE 2—Empyema of gall stone bladder (Permagnum)

History—Gall stone attacks during the preceding year, the last attack being followed by jaundice Gall bladder, distended, was palpable below the inferior margin of liver

A cholecystectomy, rather toilsome because of the adhesions of the bladder to the liver, was performed. An extensive venous hemorrhage was stopped by matted gauze tampons on the fundus of the gall bladder The gall bladder appeared greatly dilated and thick walled The cystic duct was dilated to the size of two inches and contained six stones which completely obliterated its lumen

CASE 3—Retroversion of uterus, hemorrhage, right mesocystic ovaritis

Operation—Straight middle line hypogastric incision Right ovariectomy Hysteropexia (Baldy-Dartigues)

All the patients operated on May 17 and 19, 1926, the one who died excepted, have had an uneventful recovery

PROFESSOR SCHUFFER'S CLINIC AT FLORENCE*

THE METHOD which I follow in my clinic is essentially clinical. I am convinced that the modern tendency, apparent especially in Germany, of making a diagnosis with the sole aid of the laboratory or fluoroscopy, is erroneous for one runs the risk of sad surprises

A careful case history is taken of every patient presenting himself at my clinic, and a complete semeiological examination made After that the preliminary diagnostic deductions are formulated and the scope of collateral research established, which is made as complete as possible for every patient

The most modern methods of investigation are employed in examining the urine, blood, exudates and transudates, etc, and after a second process of elimination by these measures has been made, I pass to rontgenological investigation. A diagnosis is never based exclusively upon rontgenologic and laboratory result, for experience has taught that diagnostic errors are liable to occur Our mind should judge without preconceptions and on the base of all facts which have been revealed Nor is the diagnosis made by direct deduction, but rather by elimination, for only in this manner can we be confident that all diagnostic possibilities have been taken into consideration.

* Reported by J J Moliskey, M.D

The work done in my clinic, in fact, keeps up connection with every branch of science which has any relation to clinical medicine. From simple case taking it joins hands with studies in chemistry, physico-chemistry, bacteriology, serology, roentgenology and therapy, but all these studies are coordinated to clinical purposes and are not merely discussions of purely theoretical pathology and physiology. Every one of my pupils has to work in the various branches of clinical medicine, and although he may prefer one branch above another, he is drilled to understand the other phases as well.

I will make a brief summary of the principal contributions made by our scientific activities.

DISEASES OF THE NERVOUS SYSTEM

Senile Epilepsy—I have shown that here the maximum stress should be placed on cardiac diseases and alcoholism. One must distinguish various pathologic conditions, among which the most important are

- (1) The renal form.
- (2) That due to organic disease of the brain
- (3) That due to late syphilis
- (4) That due to cerebral arteriosclerosis
- (5) The cardiovascular
- (6) Genuine senile epilepsy, which is in no way distinguishable from ordinary epilepsy

Infantile Multiple Sclerosis—I have shown that it is possible to have multiple sclerosis in childhood, but that this form is distinguished from the adult form by the inconstancy and type of nystagmus, of scanning speech, intentional tremor, and by the fact that in the spinal cord the plaques tend to be localized by preference in Goll's fibres and in the pyramidal fibres, producing pseudo-systemic lesions, and that it is to this pseudo-generalization of the lesions that the special picture of infantile sclerosis is due.

INFECTIOUS DISEASES

Malta Fever—The credit of having shown the importance of pulmonary lesions in Malta fever belongs to the Florentine School. These lesions may become localized in the apices of the lungs and give rise to symptoms which are easily confused with those of

pulmonary tuberculosis, especially when the fever, with a daily rise toward evening, runs a similar course

So, too, it was demonstrated by my school that no distinction can be made either clinically or bacteriologically between the *Bacillus abortus* of Bang and Bruce's micrococcus

My school has also brought to light certain rare syndromes of Malta infection, such, for example, as a hemorrhagic syndrome of purpura type, an icteric syndrome, etc

Malaria—Nervous Syndromes—I have demonstrated that in severe forms of malaria it is possible to have disturbances of polioencephalomyelitic type with predominance of cerebellar involvement, due to punctiform hemorrhages in the brain substance

But malaria may also produce polyneuritis. Such nervous symptoms of malaria rarely become chronic, and the hemorrhages which constitute their basis are sometimes directly due to the malaria or sometimes due to toxic action of quinine

Acute Anasarca—Acute malarial anasarca occurs in the estivo-autumnal form, and in such cases there is hydræmia of a cachectic type. I have shown that the anasarca, in such cases, is not due to renal changes, since albuminuria may not be present. In these patients there are intestinal changes, which not infrequently are of ulcerative type, and either because of such lesions, or because of malarial cachexia, and because of concomitant disturbances in the vegetative system, changes in the vascular endothelium with subsequent œdema are produced

Leukæmia—I have shown how certain infectious diseases, as for example erysipelas, acute enterocolitis, etc., may strikingly diminish the number of leukocytes, and cause regression of glandular tumors. Basing my ideas on these findings, I attempted, in 1905, to treat leukæmia by inoculation of the blood of quartan malaria patients, and I found a diminution of leukocytes from 130,000 to 13,600. The success was not lasting, but it appears possible that to-day attempts of this kind might meet with better results

Purpura Hemorrhagica.—I do not generally consider this condition primary, but secondary to various infective conditions, and that in chronic cases, especially in those forms that run a course with intercurrent attacks of purpura, great importance must be attributed to a tuberculous factor

Diabetes—With regard to diabetes, I have shown that in dogs the total suppression of the liver function causes a rapid diminution of glycosuria, while the removal of even large portions of the liver and ligation of the portal vein do not sensibly modify the glycosuria. Similarly in man we see that cases of diabetes may coexist with grave cirrhotic changes of the liver.

In acute infectious diseases glycosuria diminishes, and this is not only upon restriction of diet, but is, at least in part, independent of it.

There is not always a constant relation between glycosuria and glycaemia, and even in the same individual the two factors do not always show a parallel course.

In insulin therapy, we have noticed that there is not always a clear relation between the degree of glycosuria and the dose of insulin required for the disappearance of glycosuria, but that in such relation there is an additional individual coefficient which must be determined from case to case.

In producing unilateral renal lesions in animals rendered diabetic by extirpation of the pancreas, I observed that a slight stasis albuminuria does not cause any sensible diminution of the percentage of urinary sugar, while if a high degree of albuminuria is produced the quantity of sugar excreted by the diseased kidney is less than that excreted by the sound or less diseased kidney.

In man an analogous observation has been made, namely, that in mild albuminuria, appearing in the course of diabetes, the intensity of the glycosuria is not modified, whereas with more severe alterations there may be decrease of glycosuria. In gouty diabetes nephritic changes appear readily, and in such cases glycosuria and albuminuria may increase and decrease *pari passu*, but may, again, appear alternately.

DISEASES OF THE HEART

Pick's Disease—Ascites in so-called Pick's disease has been regarded as the result of hepatic cirrhosis of cardiac origin. I have been able to prove that in its etiology there are, concomitant to hepatic conditions, chronic peritoneal lesions of great importance, and that a simple synechia of the pericardium is not enough.

to produce this disease, there must be associated with it a mediastino-pericarditis callosa

DISEASES OF THE STOMACH

Gastric Ulcer—A notable contribution has been made to the subject of the etiology of round ulcer of the stomach.

By causing experimental lesions in dogs in the anterior and posterior roots of the spine between the fourth and ninth dorsal segments I have been able to produce hyperchlorhydria, and also small necroses and superficial hemorrhagic erosions of the mucosa, chiefly at the pylorus, and sometimes in addition circular hemorrhagic spots 1 cm in diameter, between the mucosa and the submucosa, which are probably the forerunners of round ulcer

Similarly I have been able to show in man the existence of round ulcers which apparently must be regarded as connected with the aforesaid nervous lesions in cases of lesion of the spinal cord and optic thalamus. In cases of spinal cord lesions between the eighth and ninth dorsal segments I have often observed hyperchlorhydria, even where there were no signs of ulcer

DISEASES OF THE LIVER

On the basis of clinical and experimental studies I have been able to demonstrate that it is not true that diseases of the liver always diminish elimination of urea in the urine. When there is such diminution, it must be attributed to the scant feeding of the patient. I have shown that it is possible to have even serious cirrhotic changes of the liver with an increase in the amount of urea eliminated. This occurs in cases of bronze diabetes with hepatic cirrhosis.

It has also been demonstrated in my clinic that in the majority of cases of alcoholic cirrhosis of the liver there is a diminution of the alkaline reserve, which in some cases runs parallel to the deterioration of the patient's general condition, even to the extent of causing the appearance of a veritable decompensation in the acid-base equilibrium.

Duodenal Sounding—For the diagnosis of various forms of icterus, and especially for that due to cholelithiasis, I attach great value to the use of the duodenal tube. For this purpose a modifi-

cation of Gross's bolus was made in my clinic, which permitted a more rapid and safe penetration into the duodenum

As is well known, it is possible to obtain three qualities of bile with the duodenal tube, of which the first is from the common duct, the second from the cystic duct, obtained by instillation of magnesium sulphate in 25 per cent. solution, and the third from the hepatic duct

We have shown in my school that for the enormous majority of cases this holds true, but that a negative reflex to the magnesium sulphate does not always definitely indicate a closure of the cystic duct, or grave changes in the wall of the gall-bladder hindering its contraction. A response to magnesium sulphate which is negative in repeated tests, is rarely reconcilable with the hypothesis of integrity of the gall-bladder

For the diagnosis of diseases of the bile passages, one should not be satisfied with looking for the three types of bile, but should proceed to a chemical, microscopic and cultural examination of the various kinds of bile obtained—a practice which has a good many times enabled us to clear up diagnoses that appeared obscure

Puncture—For the diagnosis of chronic forms of hepatic disease I have suggested and successfully carried out exploratory puncture of the liver. This is made with a tubular needle about 8 cm. long, with an external diameter of 1.8–2.0 mm and a lumen of 1.4–1.5 mm, with its point shaped like the mouthpiece of a flute, the sharp edge turned inward, so that it makes a circular cut. The puncture is made in the axillary lines, at the upper border of the area of absolute hepatic dulness, with this it is possible to extract small cylinders of hepatic material which lends itself to microscopic section and to histologic diagnosis. Puncture should not be done in cases of echinococcus or of acute disease of the liver

MODIFICATION OF WRIGHT'S THEORY ON THE PRODUCTION OF BLOOD-PLATELETS MODIFIED BY CESARIS DEMEL

ACCORDING to Wright's theory, it is admitted that the blood-platelets are derived from the peripheral breaking up of the protoplasm of the megakaryocytes. Cesaris Demel, though accepting this theory on the whole, modifies it as follows. He is convinced

that in the blood-forming organs particular elements grow rapidly in the surrounding mass of protoplasm under the action of a stimulus which may be explained as a demand of the organism for a greater number of platelets. These particular elements are afterwards transformed into megakaryocytes. This takes place in the form of precipitation, going on in the plasmatic substance in which these elements are immersed. The precipitation of fibrin presents a similar phenomenon.

The readily mouldable mass being free to circulate between the elements of the splenic pulp¹ is dragged into the blood in the form of filaments and enters the vessels. By this traction the whole element enters the vessels, its protoplasm is transformed into platelets, and the nucleus, which has lost its protoplasm, ultimately reaches the pulmonary arteries.

Conclusions—According to Wright's theory the platelets are derived from the protoplasm of the preexisting megakaryocytes. According to Cesaris Demel, they are derived from a precipitated mass surrounding the nucleus of the pre-megakaryocyte. This precipitation is brought about by a peculiar chemical action which is restricted to the thin initial stratum of the protoplasm of the element, brought to bear upon the substance in which the element itself is immersed.

RULES FOR OPERATIONS AT THE CLINIC FOR OBSTETRICS AND GYNÆCOLOGY OF THE UNIVERSITY OF FLORENCE*

THESE are the rules for operation followed by Prof Ersilio Ferroni in his chair.

Cancer of Body of Uterus—No radiotherapy, but radical surgical treatment.

Cancer of the Cervix—Surgical treatment (Wertheim's operation if possible). Radiotherapy (radium, X-rays) following operation, as a complementary procedure.

In inoperable cases, or when there are general contra-indications to operation, use radiotherapy.

Fibroma of Uterus—Radiation of the ovaries and tumor, pref-

¹ As Cesaris Demel has shown.

* Prof Ersilio Ferroni, Director. Reported by A. Kuhlman, M.D.

erably in single, interstitial fibromas of no very great size and without complication, results are 100 per cent positive in stopping metrorrhagia. Occasionally the tumor disappears under this treatment, frequently it diminishes. In 10 per cent of the cases later operation is required.

In all other cases, hysteromyomectomy is performed, total when necessary. Conservative treatment is carried out whenever possible. The ovaries are spared when this can be done safely. Frequently ovarian grafts are used with good results.

Ovarian Tumors—Early intervention, in cases where malignancy is suspected and in malignant tumors that are still operable, do a hysterectomy and an "adnexectomy" of the other side as well.

Retroversion of Uterus—Always do indirect abdominal hysteropexy, operating upon the round ligaments and on the vesico-uterine peritoneum, using various kinds of technic, single or combined, according to the type of case.

Prolapse—Do a general plastic operation with reconstruction of aponeurotic and muscular layers, replacement of bladder, and vaginoperineal repair. When there is coincident retroversion. Abdominal hysteropexy, followed by vaginoperineal plastic.

Adnexitis—Use operative measures only when medical treatment proves ineffectual. They should be conservative whenever possible.

Ovarian Dysfunction (Metrorrhagia of Puberty and Menopause)—(1) Of puberty. Rontgen regulation (10–12 sittings), results were excellent. (2) Of menopause. Rontgen sterilization, it yields excellent results.

Sterilization—(1) Use X-ray therapy, when there are contraindications to surgery.

(2) Surgical treatment in all other cases. If pregnancy is not present, resect the tubes and insert the stump in the broad ligaments, in case of pregnancy, resect the tubes and make intra-uterine fixation through the margin of the incision that has been made on the fundus of the uterus for the purpose of extracting the ovum. When sterilization is done for tuberculosis, it is sometimes carried out with extirpation of the ovaries.

Extra-uterine Pregnancy—Wherever possible, conservative operation, sparing the other adnexa and the uterus, always operate by way of the abdomen.

Cæsarean Section—In nearly all cases use the transperitoneal and supersymphyseal method, making section in the lower segment (Ferroni's method)

Pelvic Deformations—If there is a living foetus, always make the saving of its life the paramount consideration, no matter what the deformity (wide delivery *via* a conservative cæsarean section) Never bring about artificial interruption of pregnancy Operations for permanent widening of the pelvis, either as a complement to cæsarean section or for curative purposes, should be reserved for those few cases where the true conjugate is 8-8 5 cm

Placenta Prævia and Eclampsia—Cæsarean section if the conditions of the cervix are such that one foresees that delivery by the natural passages will be difficult (primiparas, rigid cervix, advanced pregnancy, etc.).

In other cases, Braxton-Hicks procedure and manual delivery

CASE REPORTS

May 21st First Case—In the morning an abdominal hysterectomy for a fibroma of the uterus in a woman forty two years old, removed both ovaries, because past the menopause. Of special interest. Used silk sutures only She had no trouble (with the silk) later A clever operator is very careful in ligating the stump and blood vessels with heavy silk

Second Case—Retroversion of the uterus by abdominal fixation and shortening the ligaments, claims she has no trouble in following pregnancies

Third Case—Hysterectomy, abdominal, in a woman fifty years old—both ovaries removed

May 22nd First Case—Hysterectomy for a large fibroma. Of interest here—planted one ovary on the stump of cervix and covered up with the mucus folds, only silk used.

Second Case—Hysterectomy—vaginal silk for ligating stump and broad ligaments Catgut on the outside because it wants quicker absorption here. If silk is used extraperitoneal, it should be removed in four or five days

Third Case—Rectocele Dissected a free flap up Put in fourteen catgut sutures

Fourth Case—Cæsarean section (true conjugate 7 5 cm) Abdominal method, seven inch incision, a living child, closed with silk, fourteen interrupted sutures through the uterus in closing Had given ergotin injection before. If amniotic sac is ruptured, an extraperitoneal operation

Do not give much pituitrin in this institution

Showed one woman with two uteri—three times twins—*born* two to three days apart. In the first case—one child in each *uterus*. In the second case—two children in one uterus, the other *not preg-*

nant In the third case—one child in each uterus Another pregnancy only one child

Doctor Kirch reports quintets (5) born in this hospital—all living

The hospital is in existence over 700 years

In all cases where infection is feared they give anti-streptococcic serum

All mothers have to stay two months in the institution to nurse the baby Chloroform is the anæsthetic they prefer Maternity mortality low, 3 in 1000

OPERATIONS BY PROF B NIGRISOLI AT BOLOGNA, ITALY *

WELL-LIGHTED (not artificial) operating room, room neat, good view from seats

CASE 1—Woman, twenty six years of age, greatly jaundiced, pain in gall-bladder region for several weeks (Diagnosed as probable cholelithiasis) Ether anæsthesia Iodine on skin Abdomen opened, no gall stones in bladder or ducts, gall bladder thickened, not distended (could not make out any other pathology) Cholecystectomy Gauze drain Closure

CASE 2—Man about thirty years of age Had appendix removed Pain in gall bladder region Not jaundiced Diagnosis? Ether anæsthesia Iodine on skin (First case closed by assistants and second opened into abdomen simultaneously—both patients in same room) Gall bladder removal Closed with out drain.

CASE 3—Cystic goitre Brought to operating room Local anæsthesia (1 per cent. novocain) already prepared Curved incision above margin collar bones Thorough hemostasis with ligations Goitrous cyst elevated Ruptured, excised, hemostasis by ligature Closure with small rubber tube drain Patient perfectly quiet throughout and sat on table a minute or two to adjust final dressings

CASE 4—Male, age twenty seven, barber Eighteen months' burning micturition, sometimes blood in urine. Pain in right lumbar area, radiating down toward bladder Early ureteral catheterization Left entered, not able to enter right. (I think it was said later that the right ureter was entered with catheter) Pus in urine and TB demonstrated Palpation revealed large movable mass in right side, margin of ribs

Operation—Slightly curved incision over kidney and well to front and through all structures to peritoneum Kidney about $1\frac{1}{2}$ times normal size showed ulcerated (?) areas among calices and extending into adjacent cortex, elevated Kidney forced from pedicle by clamp and ligature Incised kidney, all bleeding points closed and closure begun

* Reported by Doctor Wallace

PROFESSOR VON MULLER'S CLINIC AT MUNICH *

DISINCLINATION for cold baths is one of the first signs of tabes. Trophic change in bone is not the first change. Von Muller believes that it is the insensibility of the bone which is the primary factor, because of the lack of sensibility to the bone an injury occurs when a false step is made, the muscles not being in a state of preparedness, articular trauma results.

One of the cases demonstrated before the Interstate Post-graduate Association was one in which the injection of recurrent fever organism was used in the treatment of progressive paralysis. He believes that the injections of malaria which are used in general paralysis of the insane are not worth the danger. He has had two cases of death from malarial injection, injection was followed by high fever, rapid pulse and a condition resembling that of tropic malaria. He says that they used malaria fresh from Vienna. In early syphilis, malarial injection is better than in older syphilitic cases, because older syphilitics are less resistant to the malarial parasite.

Typhoid bacilli have been used in multiple sclerosis with fairly good results. Von Muller states that an increase of uric acid in the blood is the first symptom seen in glomerular nephritis. This occurs even before nitrogen retention is present. 3.5 mg of uric acid is the normal content of the blood but it increases to 7, 8 and 9 mg of uric acid per 100 c.c. in early stages of glomerular nephritis. In gout the red blood-cells are increased to 5, 6 and 7 millions. Von Muller states that kidney disease is frequently secondary to primary gouty effects. During the war when starvation was present, gouty effects decreased, many gouty patients improved. It is necessary to have a marked reduction in diet in order to produce a cure. A small amount of meat, 100 grams daily, does not hurt. Champagne, Burgundy, etc., are not good. Alcoholic drinks, but not alcohol itself, affect the kidneys. In chronic disease of the joints there may be used an injection of iodine.

Von Muller spoke of tumors of the spinal cord, where spinal puncture and lumbar puncture may be made. If lumbar puncture

* Dr. R. J. Behan, of Pittsburgh, a member of the Interstate Post graduate Clinic Assembly of North American Physicians during their European trip of 1926, has permitted us to use his notes of a clinical lecture delivered by von Müller, of Munich, Germany, and published with Professor Müller's permission, but without revision of the proof by him.

showed cells and a yellow fluid and the cisternal puncture did not, it indicated that there was a tumor on the cord. Then iodine, Lipoidal, injection may be made in the subdural space (lumbar) and in the cisterna magna. The area of the absence of lipoidal as shown by the X-ray will localize the tumor.

Von Muller also emphasizes that iodine given old people for bronchitis may produce a hyperthyroidism which is very dangerous. Care should be taken in the use of iodine in old people for this reason. He also emphasized the fact that in a patient who has received iodine for the throat and developed a hyperthyroidism, there is no method of correction, as there is no way to get the iodine out of the body in order to relieve the condition. It must be allowed to pass away. In hyperthyroidism the urine may contain sugar and acetone. There is frequently (usually) an increase in the sugar content of the blood. There is a reduction in the lymphocytes when the patient improves. An increase of thyroid on isolated animal hearts stimulates the auricles very much and increasing doses continue to increase the stimulation so that great activity takes place and finally there may become a condition of fibrillation and arrhythmia. The action of the thyroid secretion is directly on the heart. After the removal of the toxic agent, as by operation from a patient with hyperthyroidism, it requires a long time, even one year or more, for the patient to completely recover. After recovery, the thyroid again enlarges. In children bad effects are not common, but after the twentieth year the effect of iodine in goitre is not sure. Especially is this true after twenty-five years. In old people, one must be very careful. If a young woman is married and becomes pregnant, iodine is good. Therefore iodine should be given very carefully to pregnant women who show a slight tendency to goitre. In cases of cretins it has been noticed that in testing for the basal metabolism, when oxygen is given, there occurs a spell of coughing and restlessness and sometimes death. The death in these cases cannot be explained. In one of these cases of cretinism, the thyroid gland had degenerated and had been transformed into connective tissue and it may entirely disappear. In other cases, however, some parts of the gland remain. It is very difficult for the surgeon to know, in cases of dysfunction of the thyroid, whether he is removing the best or the worst portion of the gland. He cannot tell this by inspection or palpation.

PROFESSOR HESS' LABORATORY AT ZURICH, SWITZERLAND

Professor Hess, professor of physiology of Zurich, gave some very interesting demonstrations. He showed that the insertion of a needle into the heart of a rabbit does not disturb its action. Chloroform held before the nose reduced the action of the heart, even produced a stoppage of the pulse, then asphyxia. In the mucous membrane of the nose there are nerves, the stimulation of which produces an arrest of respiration, and this in turn reacts upon the heart. Intestinal stimulants, thermo and functional, produce no change. Pulling on the upper part of the small intestines in most cases produces a slowing of the heart. Slight pull on the mesentery produces temporary inefficiency, no reflex or motor action present. No pain. Thinks the impulses are carried by the vagus. Says that the presence of lactic acid solution produces stimulation of the heart, that is, that lactic acid is a stimulant to the heart. Phenomena also occur if lactic acid is injected into the tissues from which nerve connections go to the heart. Professor Hess said all the tissues of circulation are controlled by the sensory nerves.

Post-graduate Study

MEDICAL QUESTIONNAIRES

By HENRY W CATTELL, A.M, M.D

Fellow of the College of Physicians, Philadelphia

Now that your income tax has been put into proper shape for the Government—and it is hoped your own periodical health examination out of the way—why not take an accounting of the present state of your medical knowledge by attempting to pass the written examination of the National Board of Medical Examiners held in February of this year? You should be able to obtain from the books of your library, not forgetting the *INTERNATIONAL CLINICS*, any information forgotten or unknown to you at the time of answering the questions of the Medical Board. If such books are not thus available, and if you have no access to a good library, then they should be purchased immediately in order that a working library may always be conveniently at hand for consultation in every kind of emergency that may arise in your practice. A lawyer is well thought of by his clients when he searches his books in their presence for information, and why should not the same rule hold good for the physician even while treating his patient for any malady out of the ordinary? Then follow this up by answering, if you can, the questions covering some of the most recent advances in medical science in the way of treatment of the patient, general medical information and new words which are hardly as yet to be found even in the latest medical dictionary just off the press. For the convenience of our readers, answers to these questions are to be found on the pages which follow them.

PART I OF THE NATIONAL BOARD OF MEDICAL EXAMINERS

ANATOMY

Answer 2 and 6 and four of remaining six questions

(1) Discuss the position and relations of the submaxillary salivary gland

(2) Draw a diagram to illustrate a cross-section of the spinal cord, at about the mid-thoracic portion, and indicate the position of the motor tracts

(3) Draw a diagram to illustrate the position and relations of structures seen in a cross-section through the body at the level of the root (hilum) of the lungs

(4) Describe the lower end of the femur

(5) Describe the course and relations of the extrahepatic bile-ducts

(6) Discuss the homologies of the male and female urogenital systems

(7) Describe the structure of the longitudinal and transverse arches of the foot

(8) Discuss the palmar tendon sheaths

PHYSIOLOGY

Answer any six questions

(1) Describe the direct and indirect effects upon the mammalian heart of an intravenous injection of a potent aqueous extract of the suprarenal gland, and discuss the mechanism by which the effects are produced

(2) In what ways do the respiratory movements affect the circulation of the blood?

(3) List the effects of stimulation and of section of the nerve-fibres of the left cervical sympathetic

(4) What would be the physiological effects of gradually increasing the intracranial pressure?

(5) Discuss the coordination of the secretion of the gastric juice with the physiological needs of an average meal

(6) What is meant by conditioned reflexes? Give examples and discuss

(7) Trace the chain of physiological events involved in the reception and perception of aerial sound waves

(8) How do you account for the great variation in the quantity and concentration of urine?

PHYSIOLOGICAL CHEMISTRY

Answer any five questions:

(1) Discuss the variations in the composition of the urine brought about by pronounced changes in the level of protein metabolism.

(2) Name the principal chemical properties of d-glucose, and explain them as far as possible on the basis of its chemical constitution

(3) Discuss the origin and metabolic significance of the acetone bodies

(4) Define (a) Co-enzyme, (b) globulin, (c) nitrogen equilibrium, (d) saponification.

(5) Discuss the influence of environment on the activities of enzymes in general.

(6) Outline the more important changes in the composition of the blood associated with deficient renal function.

(7) Discuss the metabolism of calcium, with particular reference to (a) The daily requirement, (b) absorption and excretion, (c) the factors influencing bone-formation.

PATHOLOGY

Answer any five questions

(1) Discuss briefly the causes and the constitution of gall-stones

(2) Discuss the mode of entry of the *Treponema pallidum* into the body and its subsequent dissemination in the course of syphilis

(3) What is meant by the term "hypertrophy"? Discuss briefly the causes of the process. Describe an organ the seat of hypertrophy

(4) Discuss briefly the morphological changes in the thyroid gland associated with Graves's disease (Basedow's disease, or exophthalmic goitre)

(5) Describe grossly a brain the seat of tuberculous meningitis. Discuss the relation of this lesion to tuberculosis elsewhere in the body

(6) What are the commoner complications of medullary carcinoma of the pyloric portion of the stomach?

BACTERIOLOGY

Answer any five questions.

(1) (a) What is your definition of a "filtrable virus"? (b) Name the diseases of human beings that are considered to be caused by a filtrable virus

(2) If you were called to see a suspected case of epidemic cerebrospinal meningitis in the initial stage of the disease (first twelve hours), what laboratory procedures would you carry out to confirm the diagnosis and on what findings would you base a positive diagnosis?

(3) (a) Name the organisms from which toxins can be prepared for injection intradermally to determine the presence or absence of a specific immunity (b) Name the diseases in which it is practicable to establish a specific immunity by the injection of toxins or mixtures of toxins and their antitoxin

(4) Name the one culture medium that you consider best adapted for use in making initial cultures for the following purposes Blood-culture in typhoid fever, blood-culture in acute endocarditis, culture of material from ulcers or lymph-nodes in suspected tularæmia, culture of exudates from joints in suspected gonorrhœal arthritis, culture of throat exudates in suspected diphtheria.

(5) (a) State briefly the technic of the Kahn precipitation test (b) Discuss briefly its practical value as compared with the complement-fixation tests now in general use

(6) (a) Name the diseases of human beings in which agglutination reactions are of practical value in diagnosis. (b) Name the diseases of human beings in which complement-fixation tests are of practical value in diagnosis (c) What is meant by "bacteriophagia"?

MATERIA MEDICA AND PHARMACOLOGY

Answer any five questions.

(1) Outline briefly the principal pharmacologic actions of each of the following—morphine, alcohol, bromides and chloral—on the central nervous system.

(2) (a) Name three drugs that are prone to cause a skin rash (b) Give the principal pharmacologic actions of ergot (c) Name

two drugs, acting at different sites, capable of inducing emesis, and explain the action of each

(3) Compare the actions and activity of atropin, pilocarpin and epinephrin in bronchial spasm. Give dosage and state the physiological mechanism by which each drug would act

(4) What is the pharmacologic action on the intestines of each of the following Lead acetate, pituitrin, magnesium sulphate?

(5) Compare the diuretic action of potassium acetate, theobromine and digitalis Give the dosage of each for an adult.

(6) Quinine (a) What is its source? (b) Name a satisfactory preparation, and give dosage in the treatment of an adult with tertian malaria (c) How soon may the effect of its action be expected? (d) What is the first evidence of toxic action? (e) In which form of heart disease is a derivative of this drug often employed? (f) Give the adult dosage of this derivative, and its method of operation.

(7) (a) Write a prescription for compound licorice powder and state its chief ingredient (b) Write a prescription for six opium and belladonna suppositories. (c) Write a prescription for sixty Bland's pills intended for a girl twelve years of age. (d) Correct the following prescription December 10, 1926 For Mr John Jones Tincturi belladonna, grs 75, Sodæ bicarbones, drams 5, Aqui, ounces 3 Sig—One teaspoonful before each meal.

PART II OF THE NATIONAL BOARD OF MEDICAL EXAMINERS

MEDICINE

Answer 1, 2, 3, 4 and choose two from remaining questions.

(1) Describe the clinical course of tuberculous meningitis in (a) Infants, (b) adults, (c) how would you prove the diagnosis during life?

(2) Abscess of the lung Discuss (a) Etiology, (b) symptoms, (c) character of sputum, (d) treatment

(3) Name three important complications of chronic mild diabetes mellitus and discuss one of these

(4) Detail the precautions to be followed in the selection of a donor for transfusion.

(5) A young woman who had always been well except for an

attack of chorea in childhood, but who recently had noticed some palpitation and irregularity of the heart and some dyspnœa on exertion, awoke one morning to find herself unable to speak or to move her right arm and leg. Within a few hours the speech had returned and by the next day she could move the affected arm and leg. Discuss in detail the cause of the attack of hemiplegia and the sequence of events leading up to it.

(6) (a) Upon what evidence would you make a diagnosis of chronic inflammation of the gall-bladder? (b) What are the symptoms of stone impacted in the common duct?

(7) Describe the usual history and course of a case of bilateral polycystic kidney.

(8) Discuss infection with the Vincent spirillum and the associated bacillus fusiformis.

SURGERY

Answer any five questions.

(1) How would you differentiate between extradural and subdural hemorrhage? Give the usual causes and surgical management of each. (Omit operative technic.)

(2) Mixed tumors of the parotid. (a) Gross microscopical pathology, (b) differential diagnosis, (c) operative considerations, (d) prognosis.

(3) Aneurysm of left subclavian artery. (a) Method of treatment and special considerations involved, (b) difficulties, dangers and prognosis.

(4) Discuss inflammation of intestinal diverticula. (a) Congenital, (b) acquired.

(5) Acute osteomyelitis, lower end of tibia. (a) Diagnosis, (b) complications, (c) prognosis, (d) treatment.

(6) Discuss the differential diagnosis of renal colic.

OBSTETRICS

Answer any four questions.

(1) What is pelvimetry? Why should its employment lead to a decrease in maternal and foetal mortality?

(2) What factors are responsible for the higher foetal mortality in breech as compared with vertex presentation?

(3) Subsequent to the 11th term of a si

a patient gives birth to a succession of premature children at the sixth or seventh month of pregnancy. Discuss the probable etiological factors.

(4) What diseases of the new-born infant in a laying-in hospital require isolation?

(5) Define (a) Craniotomy, (b) embryotomy, (c) decapitation. Give the indications for each.

GYNÆCOLOGY

Answer any four questions.

(1) In what respects does the normal menopause differ from that produced artificially?

(2) Discuss briefly the after-results of gonorrhœa in women.

(3) What is the difference between pelvic inflammatory disease, pyosalpinx and broad-ligament abscess? Under what conditions is the latter most likely to occur?

(4) Discuss the possible effects of the presence of uterine myomata in the non-pregnant, pregnant, parturient and puerperal woman, respectively.

(5) Discuss the significance of acute pain in the right lower quadrant of the abdomen in a patient during childbearing age.

PUBLIC HEALTH

Hygiene

Answer any four questions.

(1) What are the public health functions of our Federal Government, of a State Government?

(2) Discuss the epidemiology of (a) Scarlet fever, (b) small-pox.

(3) Discuss tularæmia.

(4) Discuss carbon-monoxide poisoning.

(5) Define and give examples of (a) "Notifiable" diseases, (b) industrial hazards, (c) specific death-rate.

Medical Jurisprudence

Answer both questions.

(1) Name poisonings likely to give jaundice as a prominent symptom. (2) Define idiot, imbecile, moron; psychosis.

QUESTIONS, FOLLOWED BY A REPETITION OF THE QUESTION WITH AN ANSWER, ON RECENT ADVANCEMENTS IN MEDICINE *

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Who are the "Medical Veterans of the World War"? (Page 220)

What is the Vernes flocculation test for syphilis? (Page 222)

What is the percentage of chastity in the young men making up the classes about to graduate from the United States Military Academy at West Point? (Page 223)

What is the Meinkcke reaction? (Page 223)

What is myrtillin, and in what disease is it employed as a therapeutic agent? (Page 223)

* In this department the EDITOR will endeavor to answer such questions propounded to him by subscribers to the INTERNATIONAL CLINICS as may seem, in his opinion, to be of general medical interest. All communications should be addressed to EDITOR, INTERNATIONAL CLINICS, Cookstown, New Jersey, U S A.

What is the latest treatment of pernicious anæmia?

Minot and Murphy¹ have demonstrated to their own satisfaction that a diet containing much protein in the form of liver or kidney, and relatively low in fat, is most beneficial in the treatment of anæmia, the patient showing marked systematic improvement except in those instances where the spinal cord has been already seriously damaged by the disease. As soon as the diagnosis is made by the blood-test, a diet containing some 2000 to 3000 calories is taken by the patient, consisting of from 100 to 200 drachms or even more of cooked calf or beef liver, and in order to provide a variation in the food, kidneys may be occasionally substituted. In addition to this about half the amount of liver should be given in beef or mutton, it is to be composed largely of muscle with little fat. Lettuce and spinach are valuable in the way of vegetables and should equal in amount the total of the meat given. About twice this amount of fruit and an ounce of fat from butter and cream are allowed in order to make the food attractive. Animal fats and oils are to be excluded as far as possible, though a glass of milk and egg may be taken if desired. Dry and crusty bread, potatoes and cereals make up the balance of the diet. Sugar should be used sparingly.

Murphy, Monroe and Fitz in studying the blood of ten cases of pernicious anæmia treated in this manner give the following summary. Changes were noted in the composition of the blood in ten patients with pernicious anæmia, treated by a diet rich in liver. The results corroborate Minot and Murphy's observations that under proper dietetic care a prompt, rapid and distinct remission of the anæmia is produced in each instance. The diet appeared to cause the delivery of new, young, red blood-cells from the bone-marrow into the general circulation, as evidenced first by a prompt increase in the reticulocytes in the circulating blood. At about the time that there was evidence of a marked reaction in the bone-marrow, there was a decrease of bile-pigment concentration in the serum, as manifested by a fall in the icterus index. Coincidentally there was an increasing red blood-cell count and hemoglobin concentration,

¹ Minot, G. R., and Murphy, W. P. "Treatment of Pernicious Anemia by a Special Diet," *J.A.M.A.*, vol. lxxvii, pp. 470-476, Aug. 14, 1926.

Murphy, W. P., and Minot, G. R. "A Special Diet for Patients with Pernicious Anemia," *Boston M. and S. J.*, vol. cxv, pp. 410-411, Aug. 26, 1926.

accompanied by a progressive growth in the blood-tissue as a whole, as estimated by blood-volume determinations. The morphologic appearance of the red corpuscles under treatment became normal, or essentially so, the color index finally became one or less than one, the average cell volume diminished and approached normal, the volume index and the "stroma" index became normal. The diet did not produce changes in the non-protein nitrogen of the plasma or in the plasma-protein. The protein of the corpuscles, however, increased notably, and in almost direct proportion to the increasing hemoglobin concentration.

What is the present-day treatment of erysipelas?

Dr John H Musser, Jr,² describes his treatment of erysipelas in the Charity Hospital of New Orleans as follows

During the last eleven months there have been thirty one cases of erysipelas in the contagious disease ward, with two deaths. One death may be attributed in part to the disease, but this patient was suffering from severe cardiac decompensation when admitted to the ward, and death can be attributed to this and erysipelas considered as a contributory cause. The other death was that of a small child with widespread erysipelas of the lower half of the body and with severe toxæmia.

Shortly after the publication of a method of treatment suggested by Rivers and Tillett,¹ I commenced to treat patients having erysipelas with this form of treatment. These authors show that when small areas of skin are infiltrated with normal or immune serum, these areas become more refractory than normal skin to infection with hemolytic streptococci, and suggest that in erysipelas the spread of infection might be prevented by injection into the margins of the healthy skin of immune serum. In fourteen cases of erysipelas, such injections were made. The technic was varied considerably. In most of the cases, intracutaneous injections of anti streptococcal serum were given, infiltrating, as is done with local anesthesia, around the borders of the erysipelatous process. In the majority of cases, the process would extend to the infiltrated area and then stop, it was found. In severe cases it was possible to demonstrate beautifully the block that this would cause in the inflammatory skin process by injecting only half way across the lesion, which would then spread over the area where the serum had not been injected, but which would stop at the barrier. In some of my cases, such as erysipelas of the face, this protective barrier was put much too much below the process to have very much effect, as for example a collar round the neck of a patient suffering from facial erysipelas. This method of treatment I believe to be very efficacious in stopping the local spread of the disease. It does not, however, seem to have very much immediate effect on the gen-

¹ *J.A.M.A.*, April 16, 1927

² Rivers, T. M., and Tillett, W. S.: "Local Passive Immunity in the Skin of Rabbits to Infection with (1) a Filtrable Virus, and (2) Hemolytic Streptococci," *J. Exper. Med.*, vol. xli, p. 185, February, 1925

eral toxic symptoms and, in addition, has the disadvantage that it is time consuming to inject a large area in such a way that the entire bordering skin is infiltrated completely

The last eleven cases have been treated entirely with anti streptococcic serum, following the introduction of this antitoxin by commercial firms, prepared according to the directions of Birkhaug. The value of this serum has been well demonstrated by Birkhaug. He reports on the treatment of sixty patients with erysipelas antitoxin, and has come to the conclusion that there is a specific type of hemolytic streptococcus infection which may be controlled by a specific serum prepared by Dochez's technic of injecting agar masses infected with streptococci into a horse, and that this serum is definitely antitoxic. The observations made in the Charity Hospital substantiate the claims of Birkhaug. In the eleven patients to whom this serum has been given, there was a prompt amelioration of the toxic symptoms, a sharp drop in temperature and rapid disappearance of the lesion. It is my opinion that Birkhaug's serum offers a very distinct method in the control of the disease. In severe cases in the future, when they are not controlled by the antitoxin or are controlled imperfectly, I shall not only give the serum intramuscularly, or possibly intravenously, but shall combine with it the infiltration method suggested by Rivers and Tillett. At present, it hardly seems necessary to use this method when the patients are seen sufficiently early in the course of the disease to be benefited or cured by 20 c.c., equivalent to 500,000 skin test units, of the concentrated serum.

Compare the physiological action of ephedrine and epinephrin.

Dr J Ernest Nadler's⁴ experiments on the squid, *Loligo pealii*, show.

(1) Ephedrine and epinephrin both cause relaxation of the muscles of the chromatophores, the action of the former being slower and more prolonged

(2) Ten milligrams ephedrine given subcutaneously frequently cause gangrene and necrosis at the site of injection. Smaller doses do not cause this effect.

(3) Subcutaneous injection of 5 mgm. or more of ephedrine causes marked stimulation of the central nervous system. The same doses injected into the circulation or administered orally cause the arms to become limp and extended, which on stimulation go into a state of tonic contracture, the respiration is at first stimulated, gradually becomes slower and may even stop, causing death. Subcutaneous injection of doses of 3 or 4 mgm. cause little or no stimulation of the central nervous system.

(4) Evidence is obtained indicating an inhibitory nervous control of the melanophores of cephalopods.

⁴ *The Jr Pharm and Exp Ther.*, April, 1927

(5) Both ephedrine and epinephrin can antagonize the action of BaCl_2 and the extracts of the parathyroid and the anterior and posterior lobes of the pituitary gland

(6) Epinephrin is about twenty times as effective as ephedrine in anterior pituitary gland, twice as effective in antagonizing the action of the extract of posterior lobe of the pituitary gland Ephedrine is almost ten times more effective than epinephrin in antagonizing BaCl_2

(7) On the basis of the minimum effective dose epinephrin is two and one-half times as efficient as ephedrine

Both epinephrin and ephedrine are valuable therapeutic agents in the treatment of asthma and hypotension in such conditions as Addison's disease

What is gonophage?

A bacteriological principle elaborated by the *Gonococcus*

P S Pelouze and Frederick S Schofield ⁵ feel that there is some therapeutic value in gonophage, but that it is in no sense the long-sought-for specific of gonorrhœa, and give a clinical summary of their use of the gonophage in the treatment of this disease

(1) Undiluted gonophage has no toxic effect upon white mice when injected in quantities of 2 c.c intraperitoneally In human beings no toxic effect occurs after the hypodermic injection of 1 c.c

(2) The limitation of gonorrhœal urethritis to the anterior urethra alone in dispensary patients under oral treatment is a very rare event and is almost unknown in the negro

(3) In a series of forty such patients receiving injections of gonophage, seven of the infections remained anterior Three of these seven were negroes

(4) Such a result would suggest that the gonophage does have some favorable action against the disease in some individuals and that other ways of using it might give better results

(5) While the course of the disease in many of the cases compares well with that obtained by our best plans of local treatment, it cannot be said to be shorter or better

(6) Being even as good as that under such plans of treatment is

⁵ *Jr of Urology*, April, 1927

better than is generally seen in dispensary cases under an oral plan of treatment

(7) The occurrence of systemic and local metastases as well as the presence of gonococci in the urethral and prostatic secretions in some patients long after the administration of gonophage would suggest that it does not greatly affect the body immunity processes. This is as would be expected in a disease that produces no immunity

(8) Gonophage has no action whatever in limiting the ill effects of sexual excitement, alcohol or any of the untoward events that generally change the course of gonorrhœa for the worse

(9) The purulent response and œdema following its urethral "sealing-in" are undoubtedly due to the gonotoxin present and not to the true gonophagic principle

What is the latest treatment of scarlet fever?

Dr John H. Musser, Jr., of Tulane University of the Louisiana School of Medicine and Charity Hospital of New Orleans, writes in the *Jr Amer Med Assoc*, under date of April 16, 1927, the following present-day treatment of scarlet fever

The treatment of scarlet fever has been revolutionized in the last few years by placing on the market the anti-streptococcal serum of Dochez. The reports of men in clinical work who have used this serum have been, for the most part, most favorable. Blake,⁸ Thenebe,⁹ Park⁸ and Friedemann and Deicher¹⁰ have been most enthusiastic in their appreciation of this new remedy. Graham,¹⁰ on the contrary, has not been pleased with the use of Dochez's serum, and has found that serum disease occurred in twenty one cases out of a possible thirty-one. Twenty seven of these patients, however, were given their treatments for the purpose of immunization

There have been treated twenty eight cases of scarlet fever with the serum as prepared by a method modified somewhat from that of Dochez and now obtainable on the open market. The dose of the serum given was 10 c.c. and it is given

⁸ Blake, F. G., and Frask, J. D. "The Treatment of Scarlet Fever with Antitoxin," *Boston M and S J*, vol xciii, p 959, October 8, 1925

⁹ Thenebe, C. L. "Observations on the Administration of Dochez's Anti-scarlatinal Serum Intravenously," *Boston M and S J*, vol xciii, p 939, May 14, 1925, "Further Observations on the Administration of Dochez's Scarlatinal Antitoxin," *Ibid*, vol xciii, p 497, Sept. 10, 1925

⁸ Park, W. H. "Scarlet Fever," *J A M A*, vol lxxxv, p 1180, Oct. 17, 1925

¹⁰ Friedemann, U., and Deicher, H. *Deutsche Med Wchnschr*, vol li, p 1935, Nov 20, 1925

¹⁰ Graham, R. H. "Dochez's Scarlet Fever Antitoxin in Thirty one Cases," *J. A. M. A*, vol lxxxv, p 95, July 11, 1925

intramuscularly. The very prompt disappearance of the rash, the drop in temperature and the freedom from complications testify to the efficacy of this preparation. It is fortunate that scarlet fever (at least this applies to the cases that were hospitalized) is recognized promptly, and admission to the hospital occurs almost immediately after the appearance of the rash. Therefore it was possible to see the majority of the cases in the first two or three days of the disease.

In analyzing these cases, it was found that the rash disappeared in the majority within twenty-four hours after the injection of this serum. The throat symptoms disappeared rapidly, and the fever fell by crisis or rapid lysis shortly after the injection of the serum. The falling temperature has not been as rapid as the disappearance of the rash, and whereas the rash would have disappeared within from twelve to twenty-four hours after the injection of the serum, the fever may last two or three days, or there may be a tendency to a sharp drop followed by a small rise which lasts a day or two. In only one of the cases was there a severe serum reaction. This was in one of the few patients who was an adult. It occurred in a young woman who had had the disease three days before she was admitted to the hospital, and whose temperature fell promptly but rose again, and with whom it was thought necessary to repeat the dose. The rash was gone twenty-four hours after the second dose, but severe urticaria developed five days later, which lasted three days and caused considerable discomfort. It is interesting to note in this connection that the desquamation is usually very slight, and of particularly practical importance is the fact that patients can be discharged from the hospital in a comparatively short time after they have been admitted. Repeatedly, patients were discharged seven or eight days after they were sent in to the ward, and no case of secondary scarlet fever has appeared in their families. This is a distinct advance over the prolonged hospitalization which was considered necessary in the past and which has been dangerous to the children in a contagious disease ward or hospital because of the possibility of crossed infection occurring. Twenty-eight cases have been treated with this serum without any deaths and without complications except the one case in which the serum reaction occurred.

Of what condition in woman may the Actinomyces pseudo-necrophorus be the etiological factor?

John W. Harris and J. Howard Brown¹¹ have isolated an organism from six cases of puerperal infection which they consider may be the etiological factor of this condition. They write:

"From the uteri of women presenting puerperal infection, we have isolated strains of an organism (*Act. pseudo-necrophorus*), closely resembling *Act. necrophorus*. It differs from the latter in being non-hemolytic when grown in the blood-agar plate and in failing to ferment lactose. The two organisms do not cross-agglutinate in immune sera.

"The finding of *Act. pseudo-necrophorus* in three uteri cultured

¹¹ Bull. Johns Hopkins Hospital, April, 1927.

during a series of fifty cæsarean sections indicates that it is not uncommonly present, which receives further confirmation from the fact that it was found at autopsy in an additional patient, as well as in the course of the clinical investigation of two other patients who did not die. In all of six instances the lochi were profuse, thin and foul, in the three women delivered by cæsarean section the incision broke down and discharged large quantities of thin, greenish, foul pus, the convalescence of all six patients was prolonged beyond the normal limit and five of the six patients were seriously ill. The history of the cases from which the organism was isolated would indicate that it is not harmless, but it does not appear to be as pathogenic for human beings as is *Act. necrophorus* for animals, nor is it as pathogenic for laboratory animals injected with it. Because of the strict anaerobic requirements of the organism and its extreme sensitiveness to brief exposure to air, its presence in the human genital tract has probably been overlooked hitherto. It is hoped that further work will reveal the true significance of this organism in human infection."

What is "E 107"?

"E 107" is a new general anæsthetic introduced by the German Dye Trust and sponsored by some of the members of the Berlin Medical Society who have tried it out in their practice. It is said to be a bromine derivative which when in solution and introduced into the rectum produces rapid general anæsthesia, also relieving the surgeon while operating from inhaling the fumes of ether or chloroform which is being administered to the patient. Heart and pulse are said to remain normal and the blood-pressure is not reduced, nor are nerves or lungs damaged in the taking of "E 107". Its use may be followed by other anæsthetics as ether or chloroform by inhalation.

What is the present status in America of sterilization of defectives?

The Supreme Court of the United States has decided with one dissenting vote that the statute of North Carolina authorizing the sterilization of a feeble-minded woman, offspring of a feeble-minded mother, both of them being in the Virginia State Colony for Epileptics and Feeble-minded, and the mother of an illegitimate feeble-minded child, is permissible under the Federal Constitution.

An editorial on this subject in the *Atlantic Medical Monthly*, April, 1927, follows

In 1923 the Legislature of Delaware passed a sterilization bill which, according to Governor Robinson, has been so successful that he commended the work in his recent biennial message. In the work, which was only recently started, over thirty patients in the State Hospital have been sterilized under the law, and ninety six more are on the list awaiting operation. According to Dr M. A. Tarumianz, Superintendent of the Delaware State Hospital for the Insane, "It is the plan to sterilize from 150 to 200 every year until all the feeble minded people in Delaware have been so treated, and thereafter they will be unable to propagate, and the appearance of imbecile, insane, or feeble minded children in this state will be a thing of the past. Patients so treated become docile, useful citizens, and there is never danger of their committing an outrage. They may be paroled from the hospital with safety, thereby relieving the state of the expense of their care and treatment." In order to carry on the work the hospital trustees are asking the Legislature for \$5000 to equip an operating room.

From what we can gather, such legislation is on the statutes of about fifteen states, and practically has been adopted as a routine in all, with the exception of California. The Legislature of Pennsylvania, during the term of Governor Sprout, passed a bill permitting tubectomy and vasectomy, but on account of religious opposition, the Governor vetoed the bill. A bill was recently introduced in the Nebraska State Senate providing for sterilization of all inadequate and degenerate persons. The bill describes a socially inadequate person as "one who, by his or her own effort, fails chronically in comparison with normal persons to maintain himself as a useful member of organized life of the state." As stated in a recent newspaper editorial, "This is a remarkably inclusive classification. It would seem to take in thousands of harmless citizens of Nebraska, or for that matter, of any other state of the Union. And who is to decide what man or woman of Nebraska is deserving of this legalized mutilation and deprivation of human rights?"

There is no proposition for the control of the feeble-minded receiving so much attention as that of surgical control. There is possibly no agency that has so many advocates pro and con. Eugenists endorse it, some theologians oppose it, while advocates of personal rights and liberties strongly condemn it. Medical scientists are somewhat divided. Of the group opposing it, they do so on the grounds that they regard it as a rather drastic procedure to place in the hands of one individual, or a group of inexperienced individuals, the final decision as to who shall be desexualized, when, and how. The proposition seems too drastic to be haphazardly endorsed, or, through legislative enactment, placed in the hands of a faddist imbued with the idea that the surgical knife will eliminate entirely the feeble minded from any given state or community. They, however, feel that here again is a possible agency for good, although unless handled in accordance with definite surgical fixed laws, it will, under misleadership or enthusiasm, be subject to condemnation.

While it may be inferred that fifteen states have legislatively endorsed surgical interference, the world must patiently wait for a final evaluation, until years have placed in our hands reliable data as to the given number of feeble minded in a given state prior and subsequent to the practice of sterilization. In

the interim, mental clinics, diagnoses, correction of physical and environmental conditions, and field supervision, plus hospitalization of repeated sex offenders and the criminal types will be found exceedingly useful

What is the case of Lambert vs Yellowley?

A recent decision of the Supreme Court of the United States by a vote of 5 to 4 that Congress has power to limit the amount of whiskey which a physician may prescribe for a patient to one pint in ten days, irrespective of the patient's condition or the physician's personal opinion as to the patient's needs of such whiskey as a remedial agent. For prescribing more than a pint in the allotted time the physician may be penalized by forbidding him to use whiskey and wines in his practice for a year, and by fine and imprisonment. The last edition of the U S Pharmacopœia fails to give the average dose of whiskey and brandy as it does with other remedial agents

What is Whipple's stroma index?

The "stroma" index, as described by Whipple, is determined by dividing the normal hemoglobin percentage reading of the cell volume as determined by the hematocrit. The normal, average "stroma" index is 23

What is sodium bismuth thioglycollate?

O M Gruhzt and J A Sultzaberger¹² have studied the rate of absorption, distribution in the body and elimination of a new soluble sodium bismuth thioglycollate compound

(1) The absorption from the site of injection is complete in about two hours. A rapid distribution of the bismuth takes place through the body and it remains in the blood-stream circulation for about seventy-two hours

(2) At the end of about six hours, analyses of organs showed that bismuth had reached every organ and every tissue in the body

(3) The concentration of the bismuth in the various organs was about the same at the end of six hours as at the end of twenty-five days after the injection

(4) The bismuth appeared to be deposited in the bone in higher concentration than in other organs, except kidneys and spleen. It appeared that the bone served as a storage place for bismuth

¹² *Amer Jr of Syphilis*, January, 1927

(5) The elimination of bismuth in the excreta of animals injected with the water soluble bismuth thioglycollate preparation reached on an average 29.7 per cent in forty-eight hours and 32.7 per cent. in seventy-two hours with individual fluctuations between 23.1 minimum and 51.0 per cent maximum for this period

(6) About 65 per cent of the eliminated bismuth was found in the urine and about 35 per cent in the faeces as compared with about 80 per cent in the urine and 20 per cent in the faeces in the case of the insoluble bismuth salicylate preparation

(7) The absorption and distribution of bismuth in the body was about the same in all animals studied. The rate of elimination, however, varied widely in different animals and was independent of dosage administered. It appeared that each animal had a rate which was characteristic only to that particular animal

(8) The rate of bismuth thioglycollate elimination in the urine and faeces differed widely from that of insoluble bismuth preparations. In cases of the former, the peak of elimination was reached in seventy-two hours. In the case of insoluble bismuth preparations, as bismuth salicylate, the peak of elimination was reached towards the end of the first or the beginning of the second week

(9) The soluble bismuth thioglycollate compound probably offers superior preparation of bismuth, because it is a solution of bismuth in water and because a saturation of the body with this preparation can be obtained rapidly and under fairly precise conditions

What is the treatment of mental exhaustion and of paranoia and paranoid states?

The most useful psychotherapy in the treatment of mental exhaustion that Robert Thompson,¹³ senior assistant medical officer, St. Patrick's Hospital, Dublin, can conceive of is that the patient shall be given at the outset a simple, clear and definite picture of his illness and its causes. The fact that such illnesses are common, even amongst the finest intellects, should be impressed upon him. In his opinion the main object of psychotherapy is to relieve the patient's mind from anxiety, and in the early stages of his illness, by reason of the intensity of his depression, these anxieties are very real and painful. It is, of course, utterly impossible completely to remove these

¹³ *Jr of Medical Science*, January, 1927

anxieties, which often amount to delusions, until the depression which has given rise to them has disappeared. A simple, direct explanation, however, will often convince the patient for a short time of the real nature of his illness, and even this temporary relief must materially shorten the duration of the illness. The actual anxieties which these patients may have are, of course, legion. Some trivial incident or mistake of youth is, as a rule, resurrected to explain the depressed state, and to impress upon all his friends that he can never recover and must become hopelessly insane. This latter fear is probably best dealt with by a diatribe against the word "insanity," and by assuring the patient that his illness is simply due to depression, the result of exhaustion, and that nothing worse can occur.

Fear of insomnia is very pronounced in some cases, and a useful line of attack at St. Patrick's Hospital is to point out that absolute sleeplessness for several nights in succession is, of itself, harmless, and that it is the dread of the supposed effects of insomnia that is worrying them. This view, however, is contrary to that of Sir Maurice Craig, who believes that insomnia should be dealt with energetically. These patients sleep quite well—with perhaps an occasional disturbed night—when given 15 gr of ammonium bromide three times a day.

It must be expected that, no matter how successfully one deals with a patient's worries, similar or new ones will recur the following day, if not earlier, with the recurring depression. The few hours of comparative relief which a rational reassurance may give must, however, assist the process of regeneration and shorten the illness.

After putting one's finger on the main worries of the patient and dealing with each one in turn, Doctor Thompson thinks one ought to discourage outbursts of confidence on the part of the patient, or the unnecessary revealing of intimate matters. During the early stages a patient ought to receive some support from the doctor, at least once daily, but he should be told to expect many absurd and morbid thoughts and anxieties until convalescence is firmly established, and he should be encouraged to inhibit many of these by his own strength of will, and only to reveal the overmastering ones. Unless there are special indications, the discussion of intimate or sexual matters should be discouraged, as the recovery of many patients must be

recovered from, and appears to be almost harmless to the patient. Last year there was discharged from St. Patrick's a lady who had just had her twenty-second annual attack of mania. This patient, after spending twenty-two winters in St. Patrick's with acute mania—restless, destructive, degraded, noisy and sleepless, night after night—went out to take up a prominent social position, apparently none the worse for her illness. She had scarcely ever had a hypnotic or sedative of any kind, and *hyd. c. cret* was substituted.

In recent cases of acute mania Leeper has had excellent results with repeated doses of calomel gr. ix-v administered at night several times weekly for a few weeks, and this treatment is now followed as a routine in St. Patrick's Hospital. Tonics are administered, as before, after the first week or ten days. In depressed patients, calomel tends to increase the depression.

If one accepts the conclusion, as Doctor Thompson thinks one must, that in every mental affection there is an impairment of function of some group or groups of cortical nerve-cells, then the obvious treatment would include nerve-tonics, but so far he is not satisfied that any of the so-called nerve-tonics (glycero-phosphates, etc.) have any specific effect on the cortical nerve-cells.

PARANOIA AND PARANOID STATES

The treatment of early paranoid states must be largely empirical, because these patients rarely consult a doctor, and would usually, in fact, be highly offended if it were suggested that they needed one. Still, relatives sometimes persuade them to see a doctor, or they may consult a doctor of their own accord for depression or sleeplessness—two symptoms which often accompany their emotional storms—and one must decide on some form of treatment. If the patient admits being run "down" one may prescribe tonics, in the form of iron, etc., but as a rule these patients either take medicine reluctantly or refuse it altogether, and in any case, treatment of their physical condition must take a secondary place. Where it is at all possible, the obvious and, as a rule, the only effective treatment is an immediate and lengthy change of environment. The change should be as complete and as long as possible, for the dangers that lie ahead are very real. Companions should be chosen carefully and only those who have a sensible grasp of the nature of the illness should be

allowed to accompany the patient. The complete change, away from all objects and persons around which he has built sentiments of hatred, gives the patient the best chance of recovery. A congenial occupation should also be selected, and it may be advisable to allow the patient to occupy himself thus very fully, of course stopping short of exhaustion. In contradistinction to nearly all other mental illnesses, Doctor Thompson does not think early treatment in a mental hospital can be advocated for this type of patient. The enforced seclusion from the outside world affords him the strongest of proofs that he is the victim of a conspiracy or persecution. The physician, however, must always bear in mind that these patients are potentially both homicidal and suicidal, and the inability of relatives to guard against such contingencies is the strongest indication for certification. It must also be remembered that a mental hospital is a complete change of environment, and many patients recover to a marked extent after some months' residence. While in the hospital, a congenial occupation is almost the only treatment possible. Any conversation bearing on the patient's case or symptoms is usually resented by him, and seems to do harm, and even the volunteered information of the patient should be commented upon in a general and guarded manner. Medicines, apart from necessary purgatives, are usually resented, and may strengthen beliefs of poisoning, etc.

On their reaching a certain stage of convalescence, it is a difficult point to decide whether to allow these patients out on trial or not. Refusal to do so usually means permanent detention, while acquiescence may be fraught with terrible risks. On the whole, however, the risks are largely over-estimated, and that, given sensible and willing relatives, trials at home or with friends might be allowed with advantage to these patients.

If a case is seen very early, *i e.*, before the development of fixed delusions, it may be ideal to give the patient a certain amount of insight into his condition, and gradually to train him to be on the alert to control and banish, by his own will power, his antagonistic emotions. But this treatment is rarely practicable or even advisable, as it is a delicate and dangerous procedure, and one may lose forever the confidence of the patient. The immediate treatment should probably always be a lengthy and complete change of environment.

Does the heart adapt itself to toxic concentrations of ether?

Dr McKeen Cattell,* of New York City, has made observations on the effect of a weak ether concentration (0.5 per cent) on the activity of the isolated frog's heart. Measurements were made of the rate, output and amplitude of contraction before, during and after perfusion with the ether solution. Within the first minute of ether perfusion, there is a reduction to about $\frac{1}{2}$ in the height of contractions and the per-minute output and a marked diminution in rate. While perfusion with the ether solution is still being continued the activity of the heart gradually recovers so that in the average case the performance has returned nearly to normal at the end of ten minutes, demonstrating a definite adjustment to a concentration of ether which was initially toxic. On changing the perfusion fluid back to unmodified Ringer a further change of interest is recorded. The rate and per-minute output of the heart and the amplitude of contraction are now considerably greater than they were at the control period immediately before perfusion with ether was started. The maximum effect is recorded in the first few minutes after removal of the anæsthetic, following which there is a gradual subsidence to normal. An acquired tolerance on the part of the frog's heart has also been observed toward other depressant drugs, notably during perfusion with cinchona alkaloids. Frequently, but not always, there occurs a transitory depression of cardiac activity immediately after perfusing with a weak solution of the drug. Such an effect has been observed for quinine, quinidin, chinchonin and cinchonidin in very weak concentrations—almost one part in a million of Ringer's solution—and also during digitalis action. The demonstration of an adaptation of cardiac tissue to concentrations of ether initially toxic may have a bearing on circulatory accidents, relatively so common during the early stages of anæsthesia. This, however, is probably but one of many factors which must be adjusted in bringing the animal or patient into equilibrium with the changed conditions prevailing during anæsthesia.

Who are the Medical Veterans of the World War?

At the meeting and banquet of the Medical Veterans of the World

* Abstract of a paper presented during the Sixth Annual Congress of Anæsthetists of the United States and Canada in joint meeting with the International Anæsthesia Research Society, Washington, D. C., May 16-20, 1927.

War, composed of 2000 members, which took place at the Hamilton Hotel, in Washington, D C, May 18th, Dr Hubert Work presiding, it was resolved to unite with the Association of Military Surgeons of the United States. A committee was appointed with power to arrange the terms of this consolidation and to consummate it. This committee, composed of Lieutenant-Colonel James F Mitchell, Medical Reserves, Chairman, Admiral E R Stitt, U S Navy, General Frank R Keefer, U S Army, Colonel A. T McCormack, Medical Reserves, and Colonel J R. Kean, U S Army, retired, met on May 19th, and reports as follows

That the union is desirable for reasons well stated by General M. W Ireland, Surgeon-General of the Army, in an address delivered in Philadelphia at the annual meeting of the Association of Military Surgeons in October, 1926. He said "Another organization having a large and representative membership whose aims and purposes are identical with ours, which should be admitted to the family on an equal footing, is the Medical Veterans of the World War. Let me repeat Article II of the Constitution (which states the objects) of that society

"The Dominant Purpose of this association shall be patriotic service. The objects of this association shall be To prepare and preserve historical data concerning the medical history of the war, to cement the bonds of friendship formed in the service, to perpetuate the memory of our medical comrades who made the supreme sacrifice in this war, to provide opportunity for social intercourse and mutual improvement among its members, to do all in our power to make effective in civil life the medical lessons of the war, both for the betterment of the public health and in order that preparedness of the medical profession for possible war may be assured.

"It is my firm conviction that mutual benefits and much good would be derived by having the M V W W united with the Association of Military Surgeons. The Medical Veterans could effect this affiliation without in any way impairing the social, historical, memorial aims or usefulness of the society. Once in the Association there could be created a section specifically for the assembly of the Medical Veterans under their own chairman." Your committee believes that this union is especially advisable to accomplish the first and last of the purposes of our organization as quoted by General Ireland from our Constitution, namely, to prepare and preserve

historical data concerning the medical history of the war, . . . and in order that preparedness of the medical profession for possible war may be assured

Your committee has, therefore, under the authority conferred upon it, ratified the union of the two organizations upon the following basis

(1) All members of the Medical Veterans of the World War are eligible for membership in the Association of Military Surgeons upon payment of dues to the latter, and all members of the former in good standing become members of the latter without the payment of additional dues until July 1, 1928, and shall be enrolled as such and receive the magazine of the Association. Thereafter the annual dues of the Association (\$3 00), which includes the magazine, shall be the only dues charged them

(2) A section called the Medical Veterans' Section shall be created in the Association which shall include all Medical Veterans in the World War who are members of the Association. This section shall have such meetings, banquets, etc., as may be determined upon by the President and Secretary of the Section in accordance with Article IX of the Constitution of the Association

(3) All records, rolls, and funds of the Medical Veterans to be turned over by the Secretary to the Secretary of the Association of Military Surgeons

(4) The Committee have elected for the year beginning July 1, 1927, at which date these arrangements will go into effect, the following Section officers: President, Colonel John O. McReynolds, Medical Reserves, of Dallas, Texas, Secretary, Colonel Arthur T. McCormack, of Louisville, Ky

What is the Vernes flocculation test for syphilis?

The test, the technic for the performance of which will be found in *Proceedings of the New York Pathological Society* (1923, xxii, 193), is a valuable corroborative test for the Wassermann reaction, but of still greater value as an additional check in recording the combat of the patient against the inroads of syphilis and in giving a better understanding of the patient's condition, especially in the so-called Wassermann-fast cases presenting no clinical evidence of syphilis

but which are known to be syphilitic and to have received much anti-syphilitic treatment.

What is the percentage of chastity in the young men making up the classes about to graduate from the United States Military Academy at West Point?

Colonel P M Ashburn, Professor of Military Hygiene at the United States Military Academy, West Point, gives the following statistics, for the accuracy of which he personally vouches, in regard to the chastity of the members of the West Point classes of '25, '26 and '27

Of the 245 members of the class of 1925, 201 men between the ages of twenty-one and twenty-seven, 82 or 39.2 per cent were chaste. There were eleven infections or one infection to 258 or more illicit contacts.

Of the 152 members of the class of 1926, 146 replied to a questionnaire, and half had, and half had not had, illicit intercourse. Of the 73 who had had illicit intercourse there were but three infections, or one infection to 904 or more illicit contacts.

Of the 204 members of the class graduating this year, 95 admitted illicit intercourse, while 100, or 51.3 per cent., said they were chaste. There were three infections, or one to 420 or more illicit contacts.

Of the 17 infections during these three years, 14 were gonorrhœal, two chancroidal, and one not stated. Of those who had had intercourse previous to entering the Academy, 17 to 24 per cent. of them abstained during the period of their cadetship.—*The Military Surgeon*, May, 1927.

What is the Meynicke reaction?

A turbidity test (flocculation reaction) for the serodiagnosis of syphilis by means of the microreaction of tolu-balsam extracts.

What is myrtillin, and in what disease is it employed as a therapeutic agent?

At recent gatherings of medical men at Rochester, Atlantic City, and Washington, Dr Frederick M Allen, of Morristown, N. J., has been advocating a material extracted from the leaves of blueberries and other plants in the treatment of diabetes and other

affections in which there is a disturbance of carbohydrate metabolism. The extract is non-toxic, does not cause hypoglycemia and its therapeutic action is not hindered when administered by the mouth. Totally depancreatized dogs to live several weeks, and if wounded during this period the wounds themselves may completely heal. Dogs not completely depancreatized may apparently live on indefinitely, and the glycosuria which appears after the operation may disappear entirely. Doctor Allen does not consider his extract the equal of insulin in its therapeutic action, and deplores the exaggerated accounts of its beneficial action that have appeared in the lay press.

PERSONAL, COMMUNITY AND INDUSTRIAL HYGIENE

By WALTER S CORNELL, M.D

Director of Medical Inspection of Public Schools, Philadelphia

FOREWORD

THE subject-matter and questions as here presented are used by the Division of Medical Inspection of Public Schools, Philadelphia, in preparing the two hundred physicians and nurses of that organization for efficient service. In addition to this course in Personal, Community and Industrial Hygiene, courses are given in Diseases of School Children, Mental Hygiene, Public Health Nursing, and Clinical Diagnosis.

It is hoped that physicians engaged in general practice, and particularly those giving part of their time to public-health work, will find this condensed material of practical value.

I PERSONAL HYGIENE

I PRINCIPAL FACTORS

Rest (sleep, recreation, mental hygiene), food (diet and food habits), fresh air (including sunlight), exercise (muscles and organs), corrective measures (diseases and defects)

QUESTION ON FACTORS OF PERSONAL HYGIENE

- (1) What are the five principal factors in personal hygiene?

II FOOD

(A) *Purposes of Foods* — (1) Growth and repair of body-tissues (2) Energy, for motion (3) Energy, for heat (4) Maintenance of composition of body fluids and salts (5) Regulation of gastrointestinal tract

(B) *Quantitative Measurements of Foods* — Foods may be measured by their quantity, expressed either by weight or measure, or by their fuel value, expressed in units of heat (either British thermal units, or large Calories—briefly termed calories in this text)

To state the amount of food in terms of fuel value, remember that one large calorie is the amount of heat required to raise one kilogram (litre) of water one degree centigrade in temperature. The experimental burning of protein, fat, and carbohydrate shows that they

yield approximately Protein One pound, 2000 calories, one gram, 4 calories Carbohydrate One pound, 2000 calories, one gram, 4 calories Fat One pound, 4000 calories, one gram, 8 (9) calories

(C) *Composition of Foods*—(1) Protein, (2) carbohydrate, (3) fat, (4) salts, (5) vitamins, (6) irradiated foods, (7) water, (8) regulatory factors (insoluble residue)

(D) *Principal Food Elements—Proteins*—Contain C, O, H, and N with traces of phosphorus and sulphur Molecule is large, and contains several hundred atoms Exact composition unknown, but digestion breaks them down with formation of amino-acids and other products.

Purpose is to maintain tissue growth and repair (and therefore sustain life), also yields energy for heat and motion. Note, however, that of the eighteen amino-acids yielded by various proteins after digestion, only three or four (?) are capable of promoting tissue growth and repair These are tryptophane, cystin, lysin, and histidin (?) Consequently some proteins are "good quality proteins" (e g, gluten from wheat, casein from milk, and the protein from flesh) while some are "poor quality protein" (e g, zein from corn) All natural foods containing protein contain at least a very small quantity of some good quality protein, but the latter may not be sufficient in itself, without some other protein foods, to satisfy body requirements

Daily quantity required, 60 grams to sustain life, 100 grams optimum.

Effect of too little protein, or of insufficient good quality protein, is malnutrition, starvation of body-tissues, and ultimate death

Effect of too much protein is to overload the kidneys, which excrete the metabolic products of the protein eaten

Carbohydrates—Composition, C, O, and H. Found as starch $C_6H_{10}O_6$, or as sugar $C_{12}H_{22}O_{11}$ or $C_6H_{12}O_6$, etc Note that one molecule of water (H_2O) combined with the first or second of the above yields the third, in which form (dextrose) sugars are absorbed in the intestine

Note that the quantity production of cane-sugar has largely displaced fruit sugars and honey from our diet, with bad effects Also that pure cane-sugar as sold in stores has lost vitamins and other elements found in the original sugar-cane juice (black strap molasses).

Purpose of carbohydrate is to provide energy for motion and energy for body heat Carbohydrates are oxidized quickly in the body, and their strengthening effect is felt quickly after eating

Daily requirement, approximately 450 grams

Effect of too little carbohydrate is tendency to force the body to consume too much protein and fat instead However, man can get along without vegetable carbohydrate Example, the Eskimo In his case, only a little animal carbohydrate is consumed

Effect of too much carbohydrate is intestinal fermentation, overloading of liver and other tissues with unused carbohydrate, and then possibly diabetes Slight excess causes obesity

Fat—Composition is C, O, H Found as stearates, oleates, palmitates, butyrates, etc, in animal fat, olive oil, palm oil, butter, etc

Purpose of fat is to provide energy for heat and for motion, particularly for heat, because fat gives twice the heat of either protein or carbohydrate, on combustion Therefore used in the diet particularly in cold weather and cold climates

Daily requirement, approximately 100 grams

Effect of too little fat is tendency to force the body to consume too much protein and carbohydrate However, man can get along with practically no fat in the diet, and that much principally as a carrier of one of the vitamins

Effect of too much fat is intestinal indigestion, and obesity

Mineral Salts—Principally sodium, potassium, calcium (lime), iron, phosphorus, chlorine and iodine Sodium chloride is found throughout the tissues and in the blood Potassium salts likewise, but in smaller quantities Iron is in the blood hemoglobin. Lime and phosphorus are in the bones and teeth Phosphorus is also in the nerve-tissue Iodine is in the thyroid gland Calcium is necessary for the coagulation of the blood

Optimal daily intake of calcium (Sherman's findings) 0.67 gram, and of phosphorus 1.32 gram for adults, children need more calcium because of bone growth

The two salts which are most likely to be deficient are iron and calcium It should be borne in mind that calcium is most abundant in milk, but is also abundant in fruits, and the green and yellow vegetables Iron is most abundant in the following foods (in the

order named) Spinach, yolk of egg, asparagus, beef juice, cabbage (green leaves), apples, carrots

Note Milk is relatively deficient in iron, and infants during their first year depend on reserve iron stored in the spleen

Effect of too little calcium or too little phosphorus is rickets (one cause) Effect of too little iron is anæmia (note bad effect of prolonged exclusion of milk diet) Effect of too little iodine is goitre Too little calcium, with parathyroid insufficiency, causes tetany

Effect of too much table salt. Retention of too much water in the body, with consequent tax on the heart

Investigations in Michigan, northern Ohio, Montana, and other localities where the rains (clouds) are derived from the Great Lakes rather than the ocean, have shown large numbers of school children (mostly girls) suffering from goitre Prevention, as a public health measure, has been proposed by (1) introducing iodine into the city water supplies, (2) the use of table salt containing small quantities of iodine, (3) the administration to every school child of from 5 to 10 grains of sodium iodide every year Note that while iodine will prevent goitre, it will not always cure it, and every case of goitre should be treated by a physician

Vitamins —Composition is unknown. Minute quantities are necessary, and are able to sustain health

Fat Soluble A Found particularly in milk, cod-liver oil, animal fats, especially around glandular organs, as kidneys, and in certain vegetable seeds and leaves Ether will dissolve it out from the animal fats containing it, but in the case of vegetables, an alcohol-ether mixture must be used, probably the alcohol breaks it loose chemically, and the ether then dissolves it Takahashi of Tokio has recently extracted it from cod-liver oil, from a sea-weed, and from spinach It is a clear, thick, orange-colored oil, with an odor somewhat like carrots It resembles cholesterol (found in animal and vegetable cells), and has been called biosterin. It contains no nitrogen It is radio-active on a photographic plate in the dark, and a millionth of a gram will keep up the growth of young rats on a diet otherwise fatally deficient in this vitamin (See *Scientific Papers of the Institute of Phys and Chem Research*, Tokio, June, 1925) Too little vitamin A causes lack of growth, and malnutrition with ulcers on the cornea (keratomalacia, or xerophthalmia)

Water Soluble B Found particularly in milk, in green leaves, in the hulls of grain, and in yeast Funk in 1911 extracted this vitamin from rice polishings, by the use of alcohol, but it was mixed with other chemical compounds Numerous attempts to extract it pure have failed It contains nitrogen, but not in the form of amine compounds, as Funk assumed It has been found that to activate the secretion of milk in a female mammal with young, abundant vitamin B is required, that is, more than is required in order to insure growth in the young of the same species In this experiment, yeast was used. Levene and Van der Hooven have concentrated vitamin B in a mixture so potent that presumably 15 parts per million will provide the dietary requirements of this factor Too little vitamin B causes lack of growth, and malnutrition with neuritis (beriberi)

Water Soluble C Found particularly in milk, in fresh fruits, tomato and cabbage Of the three vitamins, this one is the most readily destroyed by heat. Hence, pasteurization of milk may diminish the amount (one reason for addition of orange juice to baby's diet) Too little causes malnutrition, with small hemorrhages in the tissues, especially the gums, irritability, and tenderness and swelling of the knees and ankles (scurvy)

Fat Soluble D (Fat-soluble substance produced by irradiation) The effect of irradiation by the sun (or by mercury-vapor lamps) is to make potent some substances in the plant or animal (possibly cholesterol is one of these) This new potent substance prevents the disease rickets It is fat-soluble and generally referred to as vitamin D, although chemically speaking possibly not a vitamin

The solar spectrum, produced by refraction of light through a prism, was found by Herschel to have invisible heat rays beyond the red, known as "infra-red" rays Later, by use of photographic plates, ultra-violet light rays were discovered

The wave-lengths of these rays are measured in "Ångstrom units"—an Å U is one ten-millionth of a millimetre

The infra-red heat rays are more than 7700 Å.U., the dark red end of the spectrum is 7700, and the last visible violet ray is 3900

In 1919 Huldshinsky reported that the light of a mercury vapor lamp helped to cure rickets He found these ultra-violet rays of less than 3000 Å.U. effective

Ordinary window glass cuts out all rays shorter than 3400 Å U "Vitaglass" is said to allow rays to 2750 Å.U to pass through Quartz allows rays to 1850 to pass (Kerr) Clouds diminish the ultra-violet light

Effect of irradiation of the human body by ultra-violet rays
Aids calcium and phosphorus supply and assimilation

A similar effect may be secured by ingestion of irradiated food
Many substances may be activated as follows

(a) The active substance in cod-liver oil (see page 246)

(b) The amount of anti-rachitic factor in cow's milk depends on whether the cow has eaten fresh green food or dry fodder, also whether the cow has been out in the sunlight, or kept in the stable without sunlight. The cows prevented from receiving ultra-violet rays are not able to secrete this anti-rachitic substance in sufficient quantities to cure or allay the progress of clinical rickets (Gowen, Murray, *et al*, Jan. 22, 1926)

(c) Similarly, it was found by investigators at the University of Wisconsin that irradiation (direct sunlight) of hens influenced egg production in several ways The anti-rachitic potency of egg-yolks from irradiated hens was about ten times that of the egg-yolks from non-irradiated hens At Kansas State Agricultural College it was demonstrated that eggs will contain much anti-rachitic factor if the hen has been out-doors, moderate if the hen has been indoors but given exposure to ultra-violet light by quartz-mercury vapor lamps for one-half hour daily, and none if the hen has been kept indoors without the ultra-violet rays Shown by the feeding of chicks on eggs from the hens just mentioned, with development of (a) no rickets, (b) moderate rickets, and (c) destructive rickets, respectively Note Other causative factors in rickets are lack of calcium, phosphorus, and potassium

It is not certain that there is a reproduction vitamin Animals will fail to reproduce under many adverse conditions It is observed that when test animals are fed certain diets of restricted character, with a consequent inability of pairs to reproduce, the same animals will reproduce if 5 per cent. of their diet is an oil which has been extracted from either yellow corn, or wheat germ, or hemp seed, or cotton seed, or olives

Water—Adult daily requirement about 50 ounces (3 pints) to compensate for daily loss through kidneys and skin.

Effect of too little water, constipation, of too much, tax on heart

Accessory Articles of Diet—These are not to be regarded as articles of food, although cocoa (which is chocolate with most of the fat removed) has possibly some slight nutritive value aside from the sugar artificially added, and alcohol in limited quantity can be utilized as food by the body. They are to be regarded as articles, some of which may be added to foods to make them more tasty and appetizing, or taken as stimulants to revive the person when fatigued (thereby also reviving appetite) or taken for slight narcotic effect to relieve the person from existing nervous tension and thereby allowing relaxation, better appetite, better enjoyment of food and better digestion.

The best means of creating appetite, securing relaxation at meal times, etc., are the natural ones (1) Proper muscular exercise and recreation, (2) proper time for eating and enjoyment of meals, (3) a happy frame of mind

The accessory articles of diet may be classed as follows. Flavors. Oils or esters that give odor or taste to foods. Condiments. Pepper, salt, mustard. Stimulants. Tea, coffee, cocoa, which contain caffeine. Practically the amount of caffeine in cocoa is so small that it may be disregarded. Stimulant and narcotic (mixed action). Alcohol. Much of the "mental stimulation" induced by small quantities of alcohol is really narcotization of inhibition. Thus the imagination may become more free but the control is less.

Regulatory Factors—Peristalsis is encouraged, with consequent free and normal bowel evacuation, by foods which contain a reasonable proportion of insoluble residue. Herbivorous animals (horses, cattle, etc.) eat food which contains considerable "roughage" (hay) as well as concentrated foods (grains). Insoluble residue is greatest in proportion in the vegetable foods, and here it is largely cellulose, which becomes soft but does not dissolve. Some fruits (prunes), eaten with the skin, furnish soft insoluble residue which is conducive to free bowel movement. The skins of many fruits have this effect and this is a reason for eating these fruits (apples, etc.) whole, rather than paring them. The hulls of grains contain some insoluble residue, and this is the reason that bran is prescribed for constipation, and whole wheat bread, or oatmeal, in preference to white bread which is made from wheat grain with most of the hull material removed. Spinach, celery, lettuce, etc., tend to prevent constipation.

On the other hand, meat tends to cause constipation because of the lack of insoluble residue, although the large proportion of water in milk, and any fermentation of the milk sugar in the intestine, tends to counteract the constipating influence

Water is the other chief regulating factor. The ordinary person should drink six glasses of water daily, bearing in mind that considerable additional water is contained in the solid or semi-solid food

Mineral oil, agar agar, yeast, and normal salt solution are used to correct existing constipation. The last consists of a quart of water (body temperature) containing two level teaspoonfuls of table salt, taken daily on arising

Balanced Diet—Natural appetite tends toward the eating of a properly balanced diet, as one becomes disgusted with a diet which is all carbohydrate, all fat, etc. However, in the artificial environment in which civilized man lives, it must be borne in mind that food is brought to the table already prepared, with a limited choice on the table. Many of the common articles of food, as eaten by us, are "denatured"—the grains being hulled and fruits pared, and also these foods are often cooked so long that the vitamins are destroyed. Also Americans eat a tremendous and unhealthful quantity of cane-sugar. Natural man depended for his sugar on what was obtained while eating fruits or honey, and most of his carbohydrate intake was starch rather than sugar

Generally speaking, the food should contain a fair quantity of green vegetables (particularly green leaves) and fruit, some of these being raw rather than cooked. Milk is useful as a sort of general corrective of miscellaneous deficiencies in our present-day diet.

The quantity of food, estimated by its fuel value, should be about 2500 calories per day for a school child of fourteen years or over, and for an adult of sedentary occupation. A man doing reasonable muscular work (carpenter) requires about 3500 calories per day. A man doing heavy laboring work requires about 5000 calories.

The proportion of protein, fat and carbohydrate is important. Average diet is protein 100 gms, fat 100 gms, and carbohydrate 450 gms. This gives 400 protein calories, 900 fat calories and 1800 carbohydrate calories, making a total of 3100 calories. The minimum amount of protein taken daily should be about 60 gms and this must then consist of good quality proteins.

Vitamin Content of Some Common Foods

Food	Vitamin A (Growth) Prevents Malnutrition (Xerophthalmia)	Vitamin B (Growth) Prevents Malnutrition (Polyneuritis)	Vitamin C Prevents Scurvy
Meat, lean	0	?	?
Cabbage, dried	xxx	xxx	xx
Cabbage, fresh*	xxx	xxx	xxxx
Carrots	xxx	xxx	x(?)
Lettuce	xx	xx	xxxx
Onions	?	xxx	xxxx
Potatoes	x	xxx	xx
Spinach*	xxx	xxx	xxx
White bread*	0	?	0
Whole meal bread*	x	xxx	0
Corn	?	x(?)	?
Oats*	?	xxx	0
Rice, polished	0	0	0
Rice, whole grain	x	xxx	0
Wheat bran	0	x	0
Beans, navy	?	xxx	0
Beans, string	xx	xx	x
Peas, dried	x	xx	0
Apples	0	xx	xx
Lemons*	0	xxx	xxxx
Oranges*	x	xxx	xxxx
Tomatoes*	xx	xxx	xxxx
Butter*	xxxx	0	0
Cod-liver oil*	xxxx	0	0
Cotton-seed oil*	?	0	0
Egg-yolk fat*	xxxx	x	0
Lard*	†	0	0
Oleo, vegetable	0	0	0
Olive oil	0	0	0
Pork fat	?	0	?
Vegetable oils*	?	0	0
Nuts	x	xxx	
Cream*	xxx	x	?
Eggs*	xxxx	xx	0
Milk, whole*	xxx	xxx	xx(?)
Yeast, brewers'*	0	xxxx	0
Yeast cakes	0	xx	0

Vitamin D is found in cod-liver oil, and in many of the foods in which vitamin A is found. As stated in the text of this article, the presence of vitamin D in milk or eggs (in which it may be strongly present) depends largely on the previous exposure to sunshine of the cow or hen that has furnished these articles.

* These should be memorised carefully

† Vitamin A in lard destroyed by heat

Tested on guinea pigs, which are very susceptible to scurvy, raw tomatoes were found to be somewhat less effective in vitamin C than either orange juice or lemon juice. When tomatoes are canned they retain about one-fourth of vitamin C, the rest being destroyed by heat. Canned tomato purée loses $\frac{3}{4}$ and retains $\frac{1}{4}$ of vitamin C.

Average Daily Menu for Adult—Sedentary Occupation

		Calories
BREAKFAST	Fruit	100
	1 medium apple, 100	
	Cereal	370
	Oatmeal, 1 cup or 8 ounces, 100	
	Sugar, 2 tablespoonsful, scant, 100	
	Milk, 1 cup, 170	
	Coffee	125
	Coffee, 1 cup, 0	
	Sugar, 2 teaspoonsful, 50	
	Cream, 1 tablespoon, 75	
	Bread	117
	White bread, 1 slice, 50	
	Butter, 2 teaspoons, 67	
	Egg	110
	Poached egg, medium size, 60	
	Toast, 1 slice, 50	
	Total calories for breakfast	822
LUNCH	Soup	160
	Cream of tomato soup, 1 cup, 160	
	Salad	200
	Tomato and lettuce salad, 100	
	Mayonnaise, 1 tablespoon, 100	
	Bread	200
	2 French rolls, 100	
	Butter, 3 teaspoons, 100	
	Dessert	400
	Apple tapioca, 400	
	Total calories for lunch	960
DINNER	Fruit	100
	Fruit cup, one serving, 100	
	Meat	200
	Lean roast beef, 2 slices, $5 \times 2\frac{1}{2} \times \frac{1}{4}$ (100 each)	
	Vegetables	260
	Green peas, canned, $\frac{3}{8}$ cup, 50	
	Spinach, boiled, $\frac{1}{2}$ cup, 20	
	Tomatoes, fresh, 1 medium, 40	
	Potatoes, 1, white baked, medium, 100	
	Cole slaw, $\frac{1}{2}$ cup, 50	
	Bread	233
	White bread, 2 slices (50 each)	
	Butter, 4 teaspoons, 133	
	Dessert	100
	$\frac{1}{2}$ canteloupe, $4\frac{1}{2}$ inches in diameter	
	Coffee	125
	Coffee, one cup, 0	
	Sugar, 2 teaspoons, 50	
	Cream, 1 tablespoon, 75	
	Total for dinner	1018
Daily total caloric intake		2800

Table Showing (a) the Composition of Familiar Foodstuffs, (b) Their Protein Energy, and Their Total Energy

Foodstuff	Condition	Composition (percentage)				Energy per lb (Expressed in Calories)	
		Prot	Fat	Carb	Water	Prot	Total
Pure fats (lard, cottolene, olive oil)*		0	100	0	0	0	4200
Butter*		0	90	0	10	0	3600
Nuts (except chestnuts)		15	60	20	5	300	3000
Chocolate	In package	14	47	18		280	2800
Cocoa	In package	5	15	75		100	2300
Cheese (American)		29	37		30	600	2100
Cheese (cottage)		21	1	4	72	400	500
Red meat (average)*	Raw	20	14	0	66	400	1000
Red meat (average)	Cooked						1300
Red meat (when fat)	Raw	17	30	0	53	350	1800
Red meat (when fat)	Cooked						1500
Red meat (when lean)	Raw	20	8	0	72	400	600
Red meat (when lean)	Cooked						960
Chicken	Raw	22	3	0	75	440	500
Chicken	Cooked						1280
Fish	Raw	16	1	0	83	320	350
Oysters	Raw	7	1	4	83	140	250
Flour (wheat, corn, oat, breakfast foods, rice)*	Uncooked	13	2	68	7	260	1700
Bread*	Baked	9	1	53	37	200	1200
Fresh vegetables (beet, cabbage, cauliflower, turnips)		2	0	6	90	40	380
Potato, white*	Raw	2	0	18	79	18	385
Potato, sweet	Raw						570
Tomatoes		1		4	95	20	105
Peas	Green	7	1	17	75	140	465
Peas	Dried	24	1	62	9	480	1655
Beans (much like peas)							
Milk, whole*		4	4	5	87	80	325
Milk, skimmed		4	0	5	90	80	180
Whey		1	0	5	94	20	125
Cream		3	16	4	76	60	900
Egg, whole*	Raw	14	11		75	250	750
Egg, white of	Raw	12	1		86	240	250
Grapes		1	2	19	77	20	450
Bananas		1	2	22	75	20	460
Celery		1	0	3	95	20	85
Spinach		2	0	3	92	40	100
Prunes	Stewed						800

* These should be memorized carefully

Table of One Hundred Calorie Portions, Showing Percentage Composition of Protein, Fat and Carbohydrate

Food	100-Calorie Portion		Distribution of Calories		
	Weight or Measure	Portions or Servings	Protein	Fat	Carbohydrate
Meats					
Beefsteak, lean*	2 oz	$\frac{3}{4}$ portion	47	53	
Beefsteak, tenderloin	1 oz	$\frac{1}{4}$ portion	47	53	
Chicken roast	$1\frac{1}{2}$ oz	1 small portion	80	20	
Lamb chops	$1\frac{1}{2}$ oz	1 small chop	40	60	
Bacon, crisp	$\frac{1}{2}$ oz	4-5 small slices	13	87	
Fish					
Lean (cod or halibut)	3 oz	small portion	61	39	
Fat (salmon or sardines)	$1\frac{1}{2}$ oz	$\frac{1}{4}$ portion	46	54	
Oysters raw	12	12 oysters	40	24	27
Soups					
Cream soups (spinach or asp.)	3 oz	small helping	17	56	27
Clear soups	30 oz	7 average portions	84	8	8
Dairy Products and Eggs					
Whole milk*	5 oz	$\frac{1}{4}$ glass	19	52	29
Skim milk	10 oz	$1\frac{1}{4}$ glasses	37	7	56
Cream, thin	2 oz	$\frac{1}{4}$ glass	5	80	0
Butter*	$\frac{1}{4}$ oz	1 tablesp scant	1	99	
Cheese American	$\frac{1}{4}$ oz	$1\frac{1}{4}$ cubic inches	26	71	3
Egg*	$2\frac{1}{4}$ oz	1 large egg	36	64	
Vegetables					
Beets	$\frac{1}{2}$ lb	6 heaping tablesp	14	2	84
Beans, lima	$\frac{1}{2}$ cup	3 heaping tablesp	23	5	72
Beans, string	$2\frac{1}{4}$ cups	12 heaping tablesp	22	7	71
Cabbage, shredded	5 cups	30 heaping tablesp	20	0	71
Corn, canned	$\frac{1}{4}$ cup	3 heaping tablesp	11	11	78
Corn, on cob	9 oz	2 ears, 6 inches long	12	0	70
Lettuce	2 heads	20 average helpings	25	14	61
Peas, green	$3\frac{1}{2}$ oz	3 heaping tablesp	28	4	68
Potatoes, sweet baked	3 oz	$\frac{1}{2}$ medium-sized potato	6	5	89
Potatoes, white, boiled*	$3\frac{1}{2}$ oz	1 medium-sized potato	11	1	88
Spinach, boiled*	21 oz	$2\frac{1}{4}$ cups	12	8	80
Tomatoes, raw*	15 oz	2-3 medium-sized tomatoes	10	16	68
Fruits					
Apple, raw*	$7\frac{1}{4}$ oz	1 large apple	3	5	92
Banana*	$5\frac{1}{2}$ oz	1 large banana	5	6	89
Orange*	$9\frac{1}{2}$ oz	1 large orange	7	2	91
Prunes, stewed*	3 oz	2 prunes and 2 tablesp juice	2		98
Raisins	1 oz	$\frac{1}{4}$ cup	3	0	88
Bread and Crackers					
White bread*	$1\frac{1}{4}$ oz	2 slices 3 in. x $3\frac{1}{2}$ in x $\frac{1}{2}$ in	14	6	80
Graham crackers	$\frac{3}{4}$ oz	2 crackers	9	20	71
Breakfast Foods					
Oatmeal*	5 oz	1 small cup	17	16	67
Grape Nuts	1 oz	3 tablesp	12	2	86
Rice, boiled	4 oz	$\frac{1}{4}$ cup	9	1	90
Shredded Wheat	1	1 biscuit	13	5	82
Candies, Pastries and Sweets					
Chocolate fudge	1 cu inch	1 piece	2	20	78
Milk chocolate sweetened	$\frac{1}{4}$ oz	small piece	7	58	35
Cup custard	3 oz	$\frac{1}{4}$ cup	17	39	44
Cookies	1 oz	2 3 inches diameter	6	32	62
Pie, apple	$1\frac{1}{4}$ oz	sector, $1\frac{1}{2}$ in at circumf	3	41	56
Boiled custard pudding	$2\frac{1}{4}$ oz	$\frac{1}{4}$ cup	13	44	43
Ice cream*	$\frac{1}{4}$ cup	$\frac{1}{4}$ average portion	4	51	45
Sugar granulated*	0.9 oz	4 teaspoonsful			100
Nuts					
Almonds	$\frac{1}{4}$ oz	10 large almonds	13	76	11
Walnuts	$\frac{1}{4}$ oz	8-10 halves	11	82	7
Peanut butter	$2\frac{1}{2}$ teasp	$2\frac{1}{2}$ teaspoonsful	19	69	12
Salads and Dressings					
Potato salad	$1\frac{1}{4}$ oz	$\frac{1}{2}$ serving	3	68	29
Tomato and lettuce salad*	$2\frac{1}{4}$ oz	$\frac{1}{2}$ serving	3	86	11
Mayonnaise dressing*	$\frac{1}{4}$ oz	1 tablespoonful	1	97	2
Boiled dressing	$2\frac{1}{4}$ oz	$\frac{1}{4}$ cup	10	64	26

*These should be memorized carefully

Specimen Day's Menu, Adult, Reducing—Total Calories about 1500

BREAKFAST	1 orange	100	
	1 cup coffee	0	
	1 tablespoonful cream	50	
	2 scant teaspoonful sugar	50	
	1 coddled egg (70), 2 small slices toast (100)	170	370
LUNCH	1 cupful bouillon, no fat	30	
	1 combination salad		
	1 tomato (30), lettuce (5), 6 stalks chopped celery (10), $\frac{1}{2}$ cucumber (10), 1 medium grated carrot (25), $\frac{1}{2}$ tablespoonful boiled dressing (10)	90	
	2 slices brown bread (100), 1 pat butter (100)	200	
	1 med -sized baked apple (50) with 2 teasp sugar (50)	100	420
DINNER	Vegetable platter		
	Creamed asparagus (200)*, beets (30), 2 onions (80), spinach (20)	330	
	Cole slaw, $\frac{1}{2}$ cup	50	
	1 cup tea with lemon	0	
	2 teasp sugar	50	
	Toasted brown bread, small slice	50	
	4 stewed prunes with juice	200	680
	Total		1470

*Contains flour, butter and milk

Notes on reducing diet. Precede by physical examination. Use systematic exercise. Keep a weight chart that the general trend of weight may be shown, irrespective of small gains and losses. Danger of exhausting baths. Sudden removal of water from tissues. Advertised remedies contain either a drastic purge or thyroid extract. Lemon does not reduce, but affords a pleasing flavor.

Specimen Day's Menu, Adult, Gaining—Total Calories about 4000

BREAKFAST	4 stewed prunes with juice	200	
	Oatmeal, 8 ounces (100) with 4 teasp sugar (100)	200	
	Cream, 8 ounces (1 cupful)	400	
	2 slices toast (100), 1 pat butter (100)	200	
	1 cup coffee (0), 1 tablesp cream (50)	50	
	2 teasp sugar in coffee	50	1100
	10 30 LUNCH Milk, $\frac{1}{2}$ pint	160	160
LUNCH	Cream of tomato soup, large plate	200	
	Macaroni (100) and cheese (200)	300	
	Tomato (30), lettuce (20), mayonnaise (150)	200	
	2 slices brown bread (100), 1 pat butter (100)	200	
	Ice cream (400) with fruit sauce (50)	450	
	2 cookies	100	1450
	4 30 LUNCH 1 glass orange juice (2 oranges)	200	200
SUPPER	Fruit salad, no dressing	100	
	Beefsteak tenderloin, average helping	300	
	Lima beans, 3 heaping tablesp (100), with melted butter, $\frac{1}{2}$ pat (50)	150	
	1 medium sweet potato	200	
	1 serving boiled spinach	20	
	2 slices bread (100), and 1 pat butter (100)	200	
	Baked apple (50), cream, $\frac{1}{4}$ glass (100)	150	1120
	Total		4030

Note on gaining diet. In addition to special diet the following procedure is urged. Physical examination, removal of defects. Provision of extra rest periods, in recumbent position.

QUESTIONS ON FOOD

(2) What are the five purposes of foods? (3) What two methods are there for measuring foods? (4) What is a calorie? (5) How many calories does one pound of protein yield? One pound of fat? One pound of carbohydrate? (Note Also memorize the fuel value of one gram.) (6) What are the eight basic food substances? (7) What chemical elements are in proteins? Name two protein foods. (8) What substances are formed when proteins are broken down by digestion? (9) Why does the body need protein? (Two functions.) (10) What is meant by a "good quality protein"? (11) How much protein should an adult eat in a day? How little may he eat in a day? (12) What is the effect on the body of too little protein? Of too much protein? (13) What chemical elements are in carbohydrates? Name two foods containing carbohydrate. (14) What two uses are made of carbohydrate food in the body? (15) How much carbohydrate should an adult eat in a day? (Approximate.) (16) What is the effect of eating too much carbohydrate? Of eating too little carbohydrate? (17) What chemical elements are in fats? Name four foods containing fat. (18) What two purposes do fats serve in the body? (19) About how many grams of fats should be eaten each day? (20) What is the effect on the body of eating too little fat? Of eating too much fat? (21) What important minerals are found in the body, and in what tissues are they found? (22) What two mineral salts are most likely to be deficient in the diet? In what foods are these two minerals found abundantly? (23) What mineral element is deficient in milk? (24) What parts of the world show deficiency in iodine, in the water and in the vegetable foods grown in that region? (25) What is the effect on the body of a diet deficient in (a) calcium, (b) iron, (c) iodine? (26) What is the effect of too much table salt in the diet on the amount of work required of the heart? (27) Is the composition of vitamins known? (Note Do not confuse the word vitamin with amino acid. Remember that the term "vitamin" is simply a name suggested by an early investigator, Funk, who had no idea of the chemical composition.) (28) What are the names of the three vitamins? (29) Name four foods rich in vitamin A. (30) What is the effect (name three) on the body of a diet deficient in vitamin A? (31) Name four foods rich in vitamin B. (32) What is the effect (name three) on the body of a diet deficient in vitamin B? (33) Name four foods rich in vitamin C. (34) What vitamin is readily destroyed by heat? (35) What is the effect (name two) of a diet deficient in vitamin C? (36) Which two vitamins influence growth as well as nutrition? (37) Give the evidence that there is a vitamin (vitamin E) which affects the capacity for reproduction. (38) In what two natural ways is it possible for a person to receive benefit from the rays of the sun? (39) Explain how the milk of one cow (or the egg of one chicken) may have anti rachitic virtues, while the milk from another cow (or the egg of another chicken) may lack anti rachitic properties. (40) What minerals and what other food factor should be in the diet as a preventative of rickets? (Note This is apart from exposing the child to sunshine.) (41) Name the vitamin content of the 18 articles of food marked with an asterisk in the table on page 233. (42) How much water should an adult drink in a day? (43) What is the effect on the body of too much water? Too little water? (44) What do we mean by accessory articles of diet? (45) Compare the stimulation of appetite by (a) natural methods, (b) accessory articles of diet. (46) Classify the accessory articles of diet and give examples. (47) What are the two regulatory

factors in diet? (48) Name five foods which help prevent constipation by reason of their insoluble residue (49) Name four factors in our American diet which tend to make it unnatural and unbalanced (50) Sum up in four words the most essential things in an adequate diet. (Fruits, green vegetables and milk) (51) What is the justification for advising milk in persons beyond the age of infancy? (52) How much fuel (number of calories) is needed daily in its food by a child fourteen years old? (53) Ditto for (a) sedentary adult, (b) reasonably active man, (c) man doing heavy laboring work. (54) Name the amount of protein, fat and carbohydrate eaten daily in a good average balanced diet. (State by weight in grams) (55) What is the smallest amount of protein that can be eaten daily with the preservation of health? (56) State the percentage composition of the eight foodstuffs which are marked with an asterisk in the table on page 235 (57) For exercise and experience, study the table on page 235, learning how to obtain the energy per pound (calories) shown in the last two columns of the table, from the information given in the columns under "Composition (percentage)" (58) State the portions or servings which will furnish 100 calories for those common foods marked with an asterisk in the table on page 236 (59) Write three daily menus, each of which will furnish from 2500-3000 calories for the day, at the same time providing fruits and green vegetables in proper amounts (60) State approximately the amount of food (expressed by fuel value in calories) which should be eaten when taking a reducing diet. (61) In undertaking a reducing diet name three things that should be done and two dangers to be avoided. (62) Ditto as for 60—for a fattening diet. (63) In endeavoring to gain weight what other health factors must be borne in mind in addition to the matter of diet?

III FOOD HABITS

Leisurely Enjoyment of Food—Allows proper time for the processes of digestion, during which the body circulation is readjusted, with more blood to the digestive organs, relaxation of nervous tension and cessation from mental concentration. It is for this reason that people with leisurely jobs, such as policemen, people attending outdoor stands, etc., have as a rule good nutrition, with good digestion, good color and tendency to take on weight. Note the cow, which ruminates (brings up) its food, and chews at its leisure, often at night-time, lying down in the pasture. Most carnivorous animals, after killing and devouring their prey, go off to sleep for many hours.

On the contrary, in our high-speed civilized life, where every minute counts, many persons hasten to a lunch counter, and without time for circulatory readjustment or secretion of digestive juices by reason of preparatory thought regarding eating, thrust food into a stomach which is unprepared for it.

The psychic aspect of digestion is seen when an animal's mouth waters (*i e*, secretes saliva) in anticipating a good meal. It is also

shown by Pavlov's experiment with a dog having an artificial gastric fistula. When meat was exhibited to the hungry dog, gastric juice was secreted and ran out of the fistula, but when a piece of meat was pushed into the dog's stomach through the fistula (the dog being unaware that it was meat) very little gastric secretion resulted.

Chewing of the food is for the purpose of tearing and grinding it into small particles, as much as it is to sympathetically start the secretion of the saliva and the gastric juice. A solid object, when broken into small particles, offers more surface, and in the case of food this means a better opportunity for the chemical action of the digestive juices. Food that has been well chewed experiences some digestion (dissolution) of the starches, and thus the proteins can be better attacked later, in the stomach, by the gastric juice. This is particularly true of vegetable foods.

Fletcher's experiments should be recalled. His poor health, rejection by an insurance company, determination to find the cause of poor health and to start at the top (his mouth), system of chewing (30 times per mouthful) used by him, effect on the food chewed (solidity, fluidity, increase or appearance of sweet taste due to conversion of starches and dextrins into sugar), improvement in health.

Foods for Quick Effect—Relative rapidity with which different foods are digested and assimilated, and their consequent relative value as quick stimulants (sugars, then proteins, then fats). Note also the quick effect of alcohol and the quick effect of "extractives" which exist in meats, and which are found in the "extract of beef" sold in drug stores. Because sugars satisfy (and quickly destroy) appetite, is the reason for desserts being eaten last at meals. However, in cases of extreme fatigue, the appetite may be lost, and then it may be revived by some light, quickly acting food, such as a little soup. Soldiers at the end of a day's march are at once given soup for this reason.

Regular Hours for Eating—This gives the stomach a rest between meals, and allows one meal, fully digested, to pass out of the stomach before another one enters. It preserves the normal appetite, which in turn influences the digestive secretions.

Water with Food—There is no absolute rule. Foods themselves vary much in the amount of water contained in them. A reasonable amount of water with meals is proper, for chemical action requires

a fluid medium to allow its accomplishment, and it is known that the digestive enzymes can act in very dilute solution. The principal thing to avoid is the washing down of the food, with draughts of water. Such a practice means that the food is not chewed, the saliva is not secreted, the stomach is not sympathetically notified by the mouth that food is coming, and the teeth are given no exercise.

Emotional Disturbances—Effect on Digestion.—Emotional disturbances affect both appetite and digestion. Probably as many cases of indigestion result from hurry, worry, and other kinds of poor mental hygiene as from the eating of the wrong kinds of food. The two faults often exist together, and then each makes the other worse.

QUESTIONS ON FOOD HABITS

(64) Why should food be eaten in a leisurely manner? (65) Why is rapid eating, as seen at the lunch counter, injurious? (66) How do we know that secretion in the stomach is influenced by the mental state of the individual? (67) What are the two purposes of chewing? (68) What food habit did Fletcher advocate, because it helped him to regain his health? (69) Give the order of relative rapidity with which proteins, fats, and carbohydrates are digested and assimilated. (70) Why are sweets and desserts placed at the end of a meal? (71) Why should soup be given to a person suffering from fatigue? (72) What is to be said in favor of regular hours for eating? (73) Discuss the amount of water which should be taken at a meal. (74) What bad food habits should be avoided when drinking water at a meal? (75) Give examples of emotional disturbances which may cause indigestion. (76) What three different measures are used in goitre regions to provide sufficient iodine in foods?

IV REST

(A) *Definition.*—Rest means not only rest in bed and sleep, but the term also includes consideration of the condition of the nervous system during waking moments. A great deal of sleep cannot counter-balance the damage done by (a) emotional disturbances (anger, fear, worry), (b) sex excesses, (c) narcotic or stimulant drugs (including alcohol, tobacco, tea or coffee in excess), (d) exhaustion from intense or continued overwork.

(B) *Physiology of Rest.*—There exist in the body alternate periods of work and rest, and it is essential to good health that both be given proper consideration. During the work period the reserves of food, found in the liver, blood and tissues, are consumed, and if work be carried past this point, the body-tissues themselves are affected with consequent damage to health. The rest period, accom-

panied by the supply of more food, is the restoration period. Activity (work) is itself a complementary necessity to rest, for the preservation of health. Hence the value of exercise.

The best rest is obtained by complete relaxation. Games, pleasurable reading, etc., act to cause relaxation of nervous tension. It is a fact, however, that the most complete relaxation is obtained by lying down, with all muscles in a state of rest. The "rest-cure" for nervous exhaustion is based on this principle.

Sleeping in a double bed, with another person, sometimes prevents complete relaxation during sleep, although the person may not be aware of it until a change to sleeping alone in a single bed demonstrates the difference.

A person suffering from nervous tension usually shows the condition by a tense condition of the muscles, so that the hands are held stiffly, the head held rigidly by the neck muscles, and the voice high pitched from contraction of the vocal cords. Such people also over-react to anything suggestive of their troubles, so that they speak or act quickly, and rapidly. Policemen and hotel clerks become very expert in detecting nervous and self-conscious persons, by reason of the over-reactions of the latter.

(C) *Fatigue*—Muscular fatigue is of no great importance in this connection, since in this country those doing heavy labor are protected by limitation of the hours of labor to from eight to ten hours daily, with a ditch digger the health factor is rather one of proper and sufficient food and body-warmth by good clothing.

In sustained mental work, or continuous nervous excitation, the fatigue period comes much earlier. The continued nervous excitation may be caused by constant petty annoyances, or by factory piece-work done at top speed for long periods continuously. It causes nerve irritability. Hence the need of recreation periods of a few minutes every hour for brain workers or factory employes doing piece-work.

A survey of the faces of those using the night-trolleys reveals the effect of habitual late hours. Many persons are in poor health because of business and financial worries, unrequited love, or domestic discord.

(D) *Effect of Nerve Fatigue on Nutrition*—Next to improper food, nerve strain is the most important cause of malnutrition in

children It occurs in the form of worry over lessons, domestic unhappiness, concealed fears of other larger children, late hours, and overwork at home Many of the boys in disciplinary schools are the victims of a combination of poor food, late hours, emotional disturbances, and cigarettes.

Mental hygiene is a most important subject Even though a person is high strung and thereby liable to damage to the nervous system, that person can by intelligence, and will, make a practice of avoiding quarrels, late hours, social excesses, and overwork A determination to be cheerful, and to take recreation systematically, will go far toward avoiding nervous exhaustion and unhappiness Much of the procedure known as psycho-analysis really consists in getting a person to forget his troubles, or to obtain relief from them, by unburdening them to some one who has a sympathetic attitude and who is able to give advice to a person who is temporarily irresolute Dreams do often indicate what is worrying a person, or they may indicate the pleasurable things that an unhappy person would like to think about The exact interpretation of the subject-matter of a dream is usually immaterial, however, any interpretation that gives comfort and decision to the patient is a good one

William J Bryan once said "The man who carries a grudge against some one else is unfortunate. Probably he will never injure the other fellow Meanwhile he has an ulcer on his own brain"

A prominent physician once said "Too much thought is bad thought" One should try to prevent an unpleasant subject from constantly recurring to the mind Such constant recurrence tends to cause a morbid condition Problems should be attacked at once and settled as soon as possible The value of a good game is that the person simply has to take his mind off his troubles in order accurately to hit or bat the ball Such exercise as walking alone is evidently far inferior to a good game with some one else, as a means of distracting one from unpleasant thoughts

QUESTIONS ON REST

(77) In addition to lack of sleep, name four important influences that may exhaust the nervous system, causing malnutrition. (78) Contrasting physiological rest with work, what processes take place in the body during the work period which necessitate a consequent rest period? (79) What is the value of moderate work (exercise) as a means of keeping the body in good health? (80) What

is the principle of the rest-cure? (81) Considering the factor of rest from the standpoint of rest in bed, which is better—sleeping singly or not singly? Explain (82) State the signs and symptoms which are usually to be noted in a nervous person (83) State two common causes of nervous fatigue, with examples of each (84) Name five causes of nerve fatigue frequently found in under nourished school children (85) Assuming determination by a person to practise good mental hygiene, name four things to be conscientiously avoided, and two good habits to be practised (86) Quote the saying of W J Bryan on the health damage caused by carrying grudges (87) What is the advantage of a game of ball as compared to taking a walk, when trying to relieve the mind of persistent unpleasant thoughts?

V AIR AND SUNSHINE *

(A) *Health Factors*—Air must be considered from standpoints of (1) its physical characteristics which affect body comfort, body vigor, and ultimately the general health (temperature, relative humidity, and air-currents), (2) deleterious substances in the air other than bacteria (smoke, carbon monoxide gas, mineral dusts and organic dusts), (3) sunlight, (4) presence of disease germs in places of close contact

(B) *Qualities of Good Air*—Man can be healthy in different climates, because of the conservation of body heat by clothing, and because of the radiation of excess body heat through perspiration and its evaporation. Much of the disease of the tropics is due to poor sanitation and consequent infection by numerous diseases such as malaria, yellow fever, various worms, etc. The Canal Zone is now one of the healthiest places in the world.

Body comfort requires that air be of reasonable temperature, and of reasonable relative humidity. In some dry hot deserts the relative humidity (25 per cent) sometimes causes discomfort, and in the tropic jungle a high relative humidity (over 80 per cent.) causes discomfort and depression.

(C) *Qualities of Bad Air*—Too hot, too cold, too dry, too moist, presence of smoke particularly in industrial towns using soft coal and oil burners, carbon monoxide gas from incomplete combustion of gases, causing deaths in garages from automobile exhausts (petromortis) and deaths at times in blast furnaces, mineral dusts as in stone cutting, pottery works where flint dust is used as a bed for the clay chinaware, and coal mines, organic dusts as in rag mills,

* The subject of air (including ventilation) must be distinguished from the subject of heating, and also from out-door exercise

dusts containing dangerous bacteria as in hair and hide industries with danger of anthrax, air vitiated by overcrowding, and carrying germs of pneumonia, common colds, tonsillitis, influenza, diphtheria, scarlet fever, measles, etc.

(D) *Ventilation*.—The modern viewpoint regarding ventilation and heating is to emphasize the physical characteristics, rather than the chemical content, of the air. The New York Ventilation Commission, after years of study, and the writing of a large book, summarized as follows: “Air should be cool, fresh, and moving.” While this statement does omit consideration of infectious diseases due to overcrowding (disease germs in the air), there is a real purpose to almost ignore the carbon dioxide content of the air, which was taken in previous years as the index of health and safety, because pure outdoor air contains only 0.4 per cent of CO_2 , while air expired from the lungs contains one hundred times as much (4 per cent).

Most states have laws requiring that new school buildings have mechanical systems of ventilation and heating (“plenum system”) whereby the air is blown through the building by a mechanical fan, with a flue at the ceiling and an outlet flue at the floor, in each room. The air is heated first at the blower in the cellar, and then further heated by other radiators, in each classroom. The temperature is automatically regulated by thermostats, set for 68, or 70. Two thousand cubic feet of air per pupil are supplied, and the rooms must have 200 cubic feet air space per pupil, and fifteen square feet floor space. The advantages of this system are (1) the changing of the air does prevent disease germs from accumulating, so that only very contagious diseases can act, and (2) the temperature is regulated better than when left to the teacher, who ordinarily will forget and allow the room to become hot. The disadvantages are (1) the system is expensive to install and to operate, (2) the air often feels stuffy and close because the air-currents are constantly in one direction and some parts of the room get none, (3) the air is likely to be too dry, if not specially moistened (air washed) as it is being warmed at the blower fan.

Strong efforts are being made to rescind the laws requiring mechanical ventilation. The American Public Health Association, October, 1925, passed a resolution condemning it, and recommending a simpler system of ventilation, whereby air is taken in at the win-

dows of the classroom and carried out by an exit flue near the ceiling, without any mechanical device (fan). It is claimed that 1000 cubic feet of air per hour is enough, and that window ventilation produces natural shifting gentle breezes with more body comfort. If this eminent body of health officers may be criticised, it should be pointed out that the proposed plan *may* be better, but it apparently takes no account of neglect of the teacher to open the windows, refusal of a thin-blooded teacher to open the windows, and we do not know whether this lessened amount of fresh air will result in greater concentration of exhaled bacteria in the air.

(E) *Sunshine*—The ultra-violet rays (invisible to the eye), which are found in sunshine, and which may be produced artificially by a quartz-mercury lamp, are essential to health—certainly in childhood, where their absence causes rickets, and probably in adult life, since prisoners confined without sunshine become pale and malnourished.

We now know that plants and animals exposed to the rays of the sun absorb the ultra-violet rays, so that their own substance becomes faintly irradiative. Thus the algæ of the sea form in the sun and are eaten by small fish (kaplan) which in turn are eaten by codfish, and the liver of the codfish, when fresh, is so full of material which has absorbed ultra-violet rays that it will make a shadow on a sensitive photographic plate placed against it in a dark room. An egg, if laid by a hen that lives out in the sunshine, can be fed (hard boiled) to a young chicken for food, and will prevent rickets in that young chicken, but an egg laid by an indoor hen will not save the young chicken that eats it, from rickets.

While encouraging the use of egg-yolks and of cod-liver oil to prevent or to cure rickets, and likewise approving of the use of the ultra-violet rays produced by the quartz-mercury lamp to prevent or cure the disease, it is evident that the simple and only necessary preventive measure is to take the child out daily into the sunlight. Note that the child should be out-doors, not behind glass, because the glass filters out most of the ultra-violet rays.

In view of the fact that about six-sevenths of the babies in a poor district in New York City were found to be suffering from rickets (*J A M A*, Aug 29, 1925) it is important to note that children of the tenements get little sunshine, even out in the street. Only for

a few hours daily does actual sunlight reach the pavements of these canyons. The smoke in the air of the average large city is estimated to cut off nearly half of the sunlight, and more than one-half of the ultra-violet rays in the sunlight. In London it is said that seven-eighths of the sun's power is shut off by smoke. It is seen, therefore, that legal steps will be necessary to correct the health menace of smoke, and provide for city streets which will receive sunshine (*Chicago Health Bull.*, Dec. 1, 1925)

QUESTIONS ON AIR AND SUNSHINE

(88) From what four standpoints must air, as a health factor, be studied? (89) Is the great amount of disease which is usually found in tropical countries due to the quality of the air? If not, what is the cause? (90) What physical quality should air possess to provide body comfort? (91) State conditions which make air unhealthful, mentioning temperature, humidity, and injurious substances in the air. (Enumerate the injurious substances.) (92) What three good physical qualities of air are required for good ventilation, according to the New York Ventilation Commission? (93) Which one of the three good qualities just mentioned provides protection against infectious diseases influenced by overcrowding? (94) Describe the mechanical system (plenum or vacuum) of ventilation, including the items of temperature, amount of air space per child, floor space per child, and amount of fresh air per hour supplied. (95) Name two advantages of the mechanical system of ventilation over ordinary window ventilation. (96) Name three disadvantages of mechanical system of ventilation compared with ordinary window ventilation. (97) Describe the simple system of school house ventilation officially advocated in 1925 by the American Public Health Association. (98) What are the essential factors preventing rickets in children? (Note: The proper answer is (1) Food containing sufficient lime and phosphorus, also (2) the child should receive direct sunshine and certain foods which have been irradiated by sunshine.) (99) Describe two experiments which show that food can be irradiated. (100) What is the effect of ordinary window glass as compared with quartz glass, on the transmission of ultra violet rays from the sun? How should this affect our method of placement of children in sunshine? (101) Give two important reasons why babies living in poor districts of cities suffer from rickets. (This refers to the matter of sunshine.)

VI CLOTHING

Purposes of Clothing—(1) To conserve body heat in cool weather and thereby maintain body temperature. (2) To allow proper evaporation from the skin when the body is warm, and thereby maintain body temperature. (3) To allow freedom of action, without compression or restriction. (4) To protect the body (from cold, heat, rain and wind). (5) To disguise as little as possible the natural beauties of the body. Note that the fifth "purpose" is a standard

statement and is therefore included. It is valid certainly in the sense that we take the best care of those parts of the body which are exposed to the critical eyes of others. Doubtless if shoes were not worn most people would have handsomer feet.

Value of Clothing Is Judged by (1) Rate of conduction of heat. The best clothing will not suffer the rapid loss of body heat in winter, and the too rapid loss of body heat in summer, but will allow sufficiently rapid loss of body heat in summer. (2) Slowness of evaporation of water (perspiration) by reason of hygroscopy. This depends on air in the meshes of the fabric, and to a less extent on the threads of the fabric. (3) Impermeability to wind (conservation of body heat). (4) Special purposes, such as rubber shoes, which are impervious to water. (5) Cost.

Fabrics Used for Clothing—Wool, silk, cotton, linen, also leather, furs and rubber.

Tests for Wool and Silk—Immerse the fabric in a strong solution of caustic potash. The animal materials (wool and silk) will dissolve, whereas the vegetable fibres (cotton or linen) will not.

Fitting of Shoes—The worst fitting article of clothing is the shoe, which is usually too short, and often too narrow, with too high a heel. There should be, for a man, an inch of clear space in front of the toe, and the shoe should be held back, over the instep, not by pushing the toe against the tip of the shoe. Note that short stockings also cause foot deformities, and that short stockings are common in children, because their feet grow after the stockings are purchased. Wool stockings become shorter by shrinking due to washing.

QUESTIONS ON CLOTHING

(102) Give five purposes of clothing. (103) How is the value of clothing to be judged, aside from the matter of appearance? (Name five factors.) (104) Name seven materials used for clothing. (105) What chemical test is used to determine whether a given fabric is wool or cotton? (106) What two things are essential to make a shoe fit the foot well? (107) Discuss the influence of stockings on foot deformities.

VII. BATHING

Purposes—(1) Cleansing of the body. (2) Maintenance of the health of the skin, with preservation of beauty and stimulation of the functional activities of the skin. (3) General tonic, to the whole system.

Frequency of Bathing — (Bathing for health should not be confounded with bathing for cleanliness) Should bathe at least twice a week for the sake of health and comfort and cleanliness combined

Dangers of Improper Bathing — Prolonged cold baths cause chilling and internal congestion Prolonged hot baths cause elimination of much carbonic acid gas with consequent increase in the alkalinity of the body fluids which may become dangerous Too sudden immersion in cold water may cause shock with danger to the heart

Medically, warm baths are used as a nerve sedative, and much used in insane hospitals, to quiet patients Cool or tepid baths are used to reduce fevers, particularly prolonged and weakening fevers such as typhoid fever Here they not only reduce the temperature, but also stimulate the kidneys with resulting excretion of poisons from the system Hot "sweats" are used to relieve persons suffering from kidney trouble, thus reminding us that the skin is a valuable excretory organ

QUESTIONS ON BATHING

(108) What are the possible dangers of (1) prolonged cold baths, (2) prolonged hot baths, (3) too sudden cold plunge? (109) What are the medicinal uses of (a) Warm baths, (b) hot baths (sweats), (c) cool baths?

VIII EXERCISE

Exercise includes (1) exercise of the voluntary muscles, and (2) exercise of the body functions, particularly of the gastro-intestinal tract.

Value of Exercise — (1) Increased strength of muscles, (2) better coordination and dexterity through training, (3) mental hygiene by recreational exercises, (4) better nutrition of the heart, lungs and abdominal organs because of improved blood circulation, (5) better elimination of waste products from kidneys and from skin

Dangers from Exercise — (1) Exercise should not be confined to one set of muscles, as this causes asymmetrical development muscularly and no development of heart and lungs (2) Exercises should not be carried to the point of extreme fatigue, with possible damage of the heart and of the muscles abused (3) Persons with weak hearts, malnutrition, tuberculosis, hernia, etc., should limit their exercises and sometimes abstain altogether Usually the improve-

ment of a weak heart is obtained by removing the diseased tonsils or other source of infection of the heart-muscle. Then the degenerated muscles in the heart will try to recover. In the case of tuberculosis of the lungs, the aim is maximum food and fresh air, but restriction of exercise for fear that the infected lung will be stirred up by the induced deeper breathing. A poorly nourished child who is toxic (from diseased tonsils, teeth, constipation, tuberculosis, etc.) usually will not want to play. If he does not want to play, he needs a medical examination, not forced exercises which may exhaust him.

Amount of Exercise—Physiologists state that an ordinary man weighing 150 pounds should do 300 foot-tons of work daily, equivalent to walking seventeen miles daily at three miles per hour. This is far in excess of what most city men, in professional or clerical work, accomplish. There is no doubt that lack of exercise and over-eating are the two common faults of professional people, and that maintenance of health after the age of fifty, and prolongation of life, will be accomplished largely through reform in these two faulty health habits.

QUESTIONS ON EXERCISE

(110) Name five benefits of voluntary exercise. (111) What two unhealthy practices should be avoided, by everyone, when exercising? (112) Name five unhealthy conditions which tend to restrict or prohibit muscular exercise. (113) What are the faults of exercise and diet commonly found in professional people and well-to-do people of middle age?

IX. MALNUTRITION—POOR GENERAL HEALTH

(A) *Causes*—The causes of malnutrition are found (1) usually to be poor personal hygiene. Improper food or insufficient food, nervous exhaustion from overwork, worry or dissipation, lack of sunlight and fresh air, and lack of exercise are the common causes. In adults making a comfortable living, the improper food may denote too much food rather than too little food. (2) The cause of malnutrition may be some poisoning of the system by disease germs found in diseased tonsils, teeth with root abscesses, tuberculosis of the lungs or glands, syphilis, malaria, hookworm, etc. (3) The cause may be kidney disease, by which excretion of waste products is decreased. (4) It cannot be denied that heredity plays some part in determining the general build of a person, but the leaders in the work of child health emphasize strongly that almost always there is a removable

cause in the case of a child suffering from malnutrition, and we should search for the cause, rather than confess failure to help by calling the condition "constitutional"

(B) *Evidence*—(1) Underweight In children, because of the coincident growth period, the best tables are those which consider the weight of a child in relation to both height and age (Wood-Baldwin Tables) While medical authorities differ slightly, the Division of Medical Inspection, Philadelphia schools, assumes that a condition of 13 per cent below average weight is required to enable a person who is not a physician safely to assume that the child suffers from malnutrition. On this basis, the school nurses select some two thousand children each year, without waiting for the school doctors, and institute health-clubs, calling in the school doctors for consultation on every case Note that many cities use 10 per cent below average weight as the criterion, but this would indicate that from 12 per cent. to 18 per cent of the children (according to neighborhood) are poorly nourished, which is an excessive figure, and one that is not substantiated by critical medical examinations (2) Anæmia, shown by pallor of the skin and mucous membranes (3) Poor nerve-muscular tone, shown by listlessness, and relaxed muscles The latter causes the "fatigue posture"—stoop shoulders, protruding abdomen, and relaxed fascial muscles Sometimes the child is irritable from nervousness (4) Flabby, soft muscles and tissues

(C) *Secondary Results of Malnutrition*.—It is realized that malnutrition in childhood is the starting-point of numerous secondary physical defects, such as nervous exhaustion, skin disease, poor development of the teeth, stoop shoulders and flat-feet, with lowered resistance to tuberculosis Rickets in infancy (a form of malnutrition) may leave the child with bony deformities such as bow-legs, pigeon breast, and extreme spinal curvature Diseased tonsils and adenoids, which are the cause of numerous secondary defects, may themselves arise, in part or whole, from malnutrition in infancy

(D) *Treatment of Malnutrition*—The treatment of malnutrition, from a medical and hygienic standpoint, is already indicated. It should be borne in mind, however, that in children the cooperation of the mother must be secured, as well as the cooperation of the child

Poorly nourished children will not get well simply by having milk poured down their throats

(E) *Personal Hygiene of Adults*—Doctor Emerson, of Boston, publishes this list of bad health habits, ascertained by a questionnaire to a large group of fifth year medical students at Tufts College, Boston. The percentages decrease gradually in this list from about 80 per cent to about 5 per cent.

Irregular bedtimes	Fast eating
Irregular habits of eating	Over or under-eating
No rest periods	Uncorrected physical defects
Inadequate annual or weekly vacations	Eating when over-tired
Irregular meal times	Excessive tea, coffee or tobacco
Irregular times for bowel movements	Working in poor air, above 68
	Uncontrolled likes and dislikes.
	Overdoing at work, and play

Doctors Dublin, Fisk and Kopf, of the Metropolitan Life Insurance Company, and Life Extension Institute, recently published an analysis of some 16,000 medical records based on periodic health examinations taken by men, mostly in business and clerical occupations. Their report showed faulty health habits were numerous, including too high protein diet, 38 per cent., too little water consumed, 37 per cent, too much tea and coffee, 41 per cent, other errors in diet, 47 per cent, tobacco excessive, 33 per cent., tobacco temperate, 12 per cent, hours of work too long, 26 per cent, lack of exercise, 61 per cent

At the age of fifty-five or more the following frequent physical defects were found Faulty posture, 29 per cent, flat-feet, 14 per cent; much over-weight, 20 per cent, defective vision uncorrected, 31 per cent, teeth with bad roots, 13 per cent, heart murmur or irregularity, 9 per cent., constipation, 40 per cent., high blood-pressure, 7 per cent, albumin in urine, 6 per cent.

There was also found a steady increase in over-weight with advancing years, to a maximum of 20 per cent in the older groups

QUESTIONS ON MALNUTRITION

(114) Name four general causes of malnutrition, with special instances of each, taking poor personal hygiene as one comprehensive cause (Note This list is only a partial one, omitting other less frequent causes such as diabetes, malign

II COMMUNITY HYGIENE

I WATER SUPPLIES

water is in the form of nitrates, the water is then free of organic matter, and is almost certainly safe for drinking purposes. However, its purity should be ascertained with certainty by also examining it for bacteria.

Notes on laboratory tests for different forms of nitrogen. By "free ammonia" is meant ammonia that can be removed by boiling. By "albuminoid ammonia" is meant ammonia which can readily be broken loose from its present chemical combination by treatment with permanganate of potassium. This converts it into "free ammonia," which can then be boiled off, collected and measured. Nitrites are unstable. Thus NaNO_2 (sodium nitrite) tends to take up additional oxygen and become the stable and permanent sodium nitrate, which is NaNO_3 .

General Rules. (i) When the ratio of free ammonia to albuminoid ammonia is high, pollution from animal source is indicated (usually urine).

(ii) When the ratio of free ammonia to albuminoid ammonia is low, pollution from vegetable source (decaying vegetation) is indicated.

(iii) As animal pollution from animal sources is more dangerous to man than pollution from decayed vegetation, the amount of free ammonia is a more important consideration than the amount of albuminoid ammonia.

(iv) The margin of safety for free ammonia is 0.05 part per million. When it reaches 0.1 part per million the water is almost certainly polluted.

(v) The presence of any nitrites condemns water for drinking purposes, because nitrites change so rapidly (being unstable) to nitrates that any amount at one time indicates much albuminoid decomposition.

(vi) Nitrates in the water result from the *complete* destruction (by oxidation) of albumins. If all the nitrogen present is in the form of nitrates, the water is free of organic matter, and *probably* free of harmful bacteria also—the latter having died out by sedimentation and from lack of food. If much nitrate is present, however, it is well to test carefully for nitrites, free ammonia, and albuminoid ammonia.

(b) Chlorides are estimated as the amount of chlorides in excess

of the normal for that district. Each state keeps official records of the latter, available to chemists. Excess chlorides are usually due to sewage in the form of urine, and to kitchen slops, these containing table salt.

Five parts per million of chlorides in water, in excess of the normal for the district, is regarded as excessive, and at least rousing suspicion of contamination.

(3) Bacteriological Tests. Investigation is made of (a) the total number of bacteria, (b) the presence of colon bacilli. Colon bacilli are found in faecal matter, being present in the intestines of men and other animals.

(a) Total bacteria should be less than 50 bacteria per c.c. of the water sample. Note that the drinking water supplied in Philadelphia has less than 25 bacteria per c.c. The test is readily made by adding one c.c. of the sample to a flat dish of nutrient gelatin, and later counting the number of colonies of bacteria. Each colony has sprung from one original bacterium.

(b) Colon bacilli in themselves are not disease producing when drunk in water, but it is assumed that where animal pollution is proved by their existence, there may also be typhoid bacilli or cholera spirilla or dysentery organisms. These disease-producing organisms are more difficult to detect than the colon bacilli, often being less numerous when they do exist.

Colon bacilli are distinguished in the laboratory from other bacilli of similar appearance by the fact that they produce both gas and acid when grown in a culture medium containing milk sugar. Note that typhoid bacilli resemble colon bacilli, they also will ferment sugars to produce acid, but they will not produce gas.

The test for gas production is made by adding 10 c.c. of the water sample to an inverted tube filled with a culture medium (broth) consisting of bouillon and milk sugar, and ascertaining if gas later collects in the upper end of the tubes. In practice, ten such tubes are set up. If more than two of the ten show colon bacilli, the water is dangerous. In other words, if there are more than two colon bacilli per one hundred c.c. of water tested, the water is considered dangerous for drinking.

If the sample shows gas, it is then tested for acid, by taking a drop or two from the gas tube (which should contain many bacteria,

having stood over night) and adding it to a flat plate culture of agar containing milk sugar, and containing either (a) litmus solution or (b) decolorized fuchsin dye (Endo's medium) If any acid is produced by the bacteria, a red color will result.

(B) *Community Water Supply*—Generally speaking, about 95 per cent of the bacteria will be removed by either slow filtration, coagulation, or prolonged sedimentation. Rapid filtration will take out approximately 75 per cent of the bacteria and most of the dirt (suspended matter). Chlorination will kill all bacteria if enough chlorine is added. As less chlorine is needed to kill all bacteria when the water is clear, it is customary to first clear the water by sedimentation, or coagulation, or filtration, and then add chlorine as a final treatment.

Sedimentation is accomplished in sedimentation basins—large reservoirs.

Coagulation is usually accomplished by aluminum sulphate, about two grains per gallon of water.

Slow filtration is accomplished by large sand filters, each filter with an area of about one acre, and several feet of sand, resting on crushed stone. One slow sand filter will filter about 2,000,000 gallons of water per day per acre. Most of the actual filtration is at the top layer of sand, where scum forms a close layer.

Rapid filtration is accomplished by smaller sand filters, really large tanks. Here there must be preliminary coagulation in order to have the water fairly clear before filtration. The water is filtered rapidly by having a high pressure or "head" of water through the filter. Rapid filters soon become clogged, but they are readily cleaned, by stirring up the dirty sand, flushing them out with water introduced at the bottom and overflowing the filter at the top. The rate of filtration is many times as rapid as in a slow filter, running up to 100,000,000 gallons per day per acre.

Chlorination is accomplished by adding chlorine gas, or by adding hypochlorite of lime. The former is usually used in drinking water, and the latter to purify sewage effluents. Chlorine gas is added in the amount of about one part per million.

At the large filter plant at Torresdale, Philadelphia, which supplies water for over one million people, all five processes, sedimentation, coagulation, rapid filtration, slow filtration, and chlorination,

are used successively, before the water is pumped to the final storage reservoirs

QUESTIONS ON COMMUNITY HYGIENE

(123) What three kinds of tests are used in testing drinking water? (Turbidity, chemical, and bacteriological) (124) Discuss the relation between clear water and pure water (125) For what two chemical elements are chemical tests of drinking water made? (126) What are the two original sources of the nitrogen found in water? (127) In what five successive forms (chemical compounds) is nitrogen found when protein matter decomposes in water? (128) What is meant by albuminoid ammonia? By free ammonia? What is the formula of sodium nitrite? What is the formula of sodium nitrate? (129) As a general indication whether existing pollution of water is due to animal or vegetable matter, discuss free ammonia and albuminoid ammonia (130) In testing water for free ammonia, how many parts per million are taken as the limit of safety? (131) What is the significance of nitrites in drinking water? (132) What is the significance of nitrates in drinking water? (133) What is the significance of chlorides in drinking water? (134) What amount of chlorides found in drinking water is the margin of safety? (135) What are the two principal things to be investigated in the bacteriological examination of drinking water? (136) In examining drinking water, what is the margin of safety? (Considering the number of bacteria per cubic centimetre) (137) Why is the presence of colon bacilli in drinking water a matter of investigation? (138) What two cultural characteristics do colon bacilli possess, used in the laboratory for their detection? (139) Describe in a general way how the test for gas production by bacteria is made (140) Describe in a general way how the test for acid production by bacteria is made (141) Describe five methods used in effecting the purification of community water supplies

(Continued in September issue)

Address of President Coolidge before the Washington Meeting of the American Medical Association*

AMERICA has so many elements of greatness that it is difficult to decide which is the most important. It is probable that a careful consideration would reveal that the progress of civilization is so much a matter of interdependence that we could not dispense with any of them without great sacrifice. But those who have witnessed the general paralysis which prevails when even a moderate epidemic breaks out cannot help but realize that one of the most important factors in our everyday existence is the public health, which has come to be dependent upon sanitation and the medical profession. We are constantly in receipt of the beneficial activities of these efforts in the disposition of waste, the water we drink, the food we eat, and even in the air we breathe. This great work is carried on partly through private initiative, partly through government effort, partly by a combination of these two working in harmony with the science of chemistry, of engineering, and of applied medicine. In its main aspects it is preventive, but in a very large field it is remedial. Without this service our large centres of population would be overwhelmed and dissipated almost in a day and the modern organization of society would be altogether destroyed. The debt which we owe to the science of medicine is simply beyond computation or comprehension.

BENEFITS HAVE COME WITHIN FEW GENERATIONS

These benefits have almost all come to the world within a few generations. Pure science, as we understand the term, has a very recent origin. In fact, we do not go back but a short distance to find the first modern comprehension of the difference between sound thought and visionary speculation. Since that day we have come to what is known as the scientific age. Almost all over the world men are making observations, collecting accurate information, com-

* Publication obtained through the courtesy of Major James F Coupal, M.D., and Morris Fishbein, M.D.

paring ascertained facts, and working toward established conclusions. Although great progress has been made and certain fundamental rules have become well established, we cannot yet estimate the development of scientific research as much more than begun. But great effort is being put out all around us and a constant advancement of knowledge is in progress. This has been especially true in the science of medicine. Many of the diseases which laid a heavy toll on life have been entirely eradicated and many others have been greatly circumscribed. The average length of life has been much increased. But there is still an enormous economic loss in sickness, and the list of maladies for which no remedy is known is still large. How far the mind has an effect on the body is not yet accurately known. What mental reactions may be set up to preserve health or combat disease cannot yet be stated.

If there is any one thing which the progress of science has taught us, it is the necessity of an open mind. Without this attitude very little advance could be made. Truth must always be able to demonstrate itself. But when it has been demonstrated, in whatsoever direction it may lead, it ought to be followed. The remarkable ability of America to adopt this policy has been one of the leading factors in its rise to power. When a principle has been demonstrated, the American people have not hesitated to adopt it and put it into practice. Being free from the unwarranted impediments of custom and caste, we have been able to accept whole-heartedly the results of research and investigation and the benefits of discovery and invention.

This policy has been the practical working out of the applied theory of efficiency in life. We have opened our mines and assembled coal and iron with which we have wrought wonderful machinery, we have harnessed our water power, we have directed invention to agriculture, the result of which has been to put more power at the disposal of the individual, eliminating waste and increasing production. It has all been a coordination of effort, which has raised the whole standard of life.

THE PART OF THE SCIENCE OF MEDICINE IN THIS DEVELOPMENT

In the development of this general policy the science of medicine has had its part to play. No tendencies in recent history have been more outstanding than those toward conservation and coopera-

tion, both in public and private activities. For years the value of conservation of our material resources, forests, mineral deposits, water power, animal life, has been generally recognized. Movements have been started to cut down waste and unnecessary destruction in business and industrial operations. We are practising economy in our governmental affairs. But the conservation of human health and life is one of the greatest achievements in the advance of civilization, both socially and economically.

What an incalculable loss to the world may have been the premature blotting out of a single brilliant creative mind which might have been saved through modern healing or preventive measures. Efficiency experts translate into dollars and cents what disease and the resulting loss of manpower mean. Directly, disease costs heavily. Indirectly, its results are even more costly. In the days before medical men robbed them of their terrors, a single case of yellow fever or cholera reported in New York harbor caused such panic as seriously to interfere with business. Now such sporadic cases would scarcely cause public comment. Industry now figures what disease and temporary disability of employes, from the highest to the lowest, means on the yearly balance sheet. It is not uncommon for a corporation to take out an insurance policy for its own benefit on the life of an executive. Thus it attempts to neutralize the monetary loss it presumably might suffer through being deprived of his services.

Factory buildings now are equipped with modern sanitary and hygienic devices. Large industrial establishments employ not only doctors but nurses to care for their employes. Industry has found all of this not only a social but a financial benefit. The cost of such improvements has been returned many times in the amount of productive labor saved. Life insurance companies have health clinics and distribute hygienic literature. Several have sanatoriums for the treatment of their policy holders.

There is no finer page in the history of civilization than that which records the advance in medical science. The heroism of those who have worked with deadly germs and permitted themselves to be inoculated with disease, to the end that countless thousands might be saved, was less spectacular but no less far-reaching than that on

the battlefield or of an isolated rescue from a burning building or a sinking ship

PROGRESS HAS BEEN MARKED SINCE EARLY IN NINETEENTH CENTURY

In the early part of the nineteenth century there were only three medical schools in the United States and two general hospitals. Since then progress has been marked. Writing in 1901, William Osler said the average working life of English-speaking men had been doubled within three centuries. Most of that gain has been made in the last half century. The development of preventive medicine has been one of the outstanding features of that period. Whereas in the old days the doctor healed, if he could, those who had become afflicted, the greatest stress to-day is laid upon keeping the body sound and efficient. Proper methods of living are taught and suitable diets are prescribed. Hygienic conditions for the home, the workshop, and the factory have been adopted. Periodic physical examinations are urged in order that disease may be turned back before it has become seriously developed.

In all this work our governments—national, state, and local—have recognized that the preservation of health and the conservation of life are in part public functions. Health boards have been established, hospitals built and maintained, and hygiene taught in the schools. The Public Health Service of the Federal Government has taken a leading part in combating disease and in sanitary education. No more striking achievement was ever accomplished than by Doctor Gorgas, of the United States Army, in cleaning up the Panama Canal Zone. Under French control, the death-rate in that area was 240 per thousand. In 1913 it had dropped to 8.35 per thousand. Without this work the construction and operation of the canal would have been impossible.

Universities and colleges, and even secondary schools, have their resident doctors and infirmaries. Not a few individuals, who can afford such health assurance, retain physicians to look after them the year around. Only recently the movement for prevention, or relief in the early stages, has been extended to mental diseases. Cities are establishing mental clinics, and many educational institutions have

departments for studying and alleviating mental distress which so frequently leads to serious consequences for the student.

COOPERATION AND TOLERANCE FOUND IN MEDICAL PROFESSION

Coöperation and tolerance, which have been developed so widely in industry and social relations, are now found in a marked degree in the medical profession. The work being done by the American Medical Association is a striking illustration of this. In years gone by physicians were apt to be suspicious and intolerant of other schools and of other methods of treatment. There has been a great change. The modern broad-minded physician is willing to use or to recommend whatever methods seem best suited to the case in hand. Furthermore, he is the strongest advocate of prevention. He it is who is taking the lead in the development of everything which promises to promote health and to reduce sickness to the minimum, even though its tendencies are to diminish the practice upon which he relies for his income.

All of these accomplishments are distinctly in the line of conservation through social service. The society of this country has become so well organized, its charities have become so broad and inclusive, that the great body of our population is able to secure adequate medical attention. This is true to a remarkable degree of all our great centres of population, and it is only in remote quarters that such service cannot be provided. Our larger cities support free dispensaries, our hospitals have provision for free service, and of all the professions, with the possible exception of the ministry, our physicians give most unsparingly of their time and their skill for the alleviation of human suffering. Our governmental agencies, our organized charities, and our private benefactors are all giving generous support to this most important purpose.

This is an enormous contribution that has been made to human welfare. It is one of the undeniable evidences of the soundness and success of American institutions. The fact that our attainments and our blessings have become common is no reason why they should be ignored. Constructive criticism is always proper and ought to be helpful. Mere fault finding has no value except to reveal the poverty

of the intellect which constantly engages in it Our government, our state of society, are a long way from being perfect, but the fact that our structure is not complete is no reason for refusing to assess at their proper value the usefulness and the beauty of those parts which are nearing completion, or withholding our approval from the general plan of construction and neglecting to join in the common effort to carry on the work

The human race is by no means young It has reached a state of maturity It is the inheritor of a very wide experience It has located a great many fixed stars in the firmament of truth. No doubt a multitude of others await the revelation of a more extended research But because we realize that we have not yet located them all is no reason for doubting the existence of those already observed or disregarding the records which reveal their position. To engage in such a course would lead to nothing but disaster One of the difficulties in the world is not that we are lacking in sufficient knowledge, but that we are unwilling to live in accordance with the knowledge which we have Approbation of the Ten Commandments is almost universal. The principles they declare are sanctioned by the common consent of mankind We do not lack in knowledge of them We lack in ability to live by them.

Somewhere in human nature there is still a structural weakness We do not do as well as we know We make many constitutions, we enact many laws, laying out a course of action and providing a method of relationship one with another which are theoretically above criticism, but they do not come into full observance and effect Society is still afflicted with crime, and among the nations there are still wars and rumors of wars In spite of all our progress and all our success, no one doubts that much yet remains to be done

What part the physician will play in the further advancement of the well-being of the world is an interesting speculation It is a well-known proverb that "Cleanliness is next to godliness" No one can doubt that if humanity could be brought to a state of physical well-being, many of our social problems would disappear If we could effectively rid our systems of poison, not only would our bodily vigor be strengthened, but our vision would be clearer, our judgment

more accurate, and our moral power increased. We should come to a more perfect appreciation of the truth. It is to your profession in its broadest sense, untrammelled by the contentions of different schools, that the world may look for large contributions toward its regenerations, physically, mentally and spiritually, when not force but reason will hold universal sway. As human beings gain in individual perfection, so the world will gain in social perfection, and we may hope to come into an era of right living and right thinking, of good will and peace, in accordance with the teachings of the Great Physician.

Gleanings from Papers Read before the Washington Meeting of the American Medical Association

Health Conservation as Higher Province of Medicine *—"When a sick person applies to a physician for treatment, there may appear but little to do with regard to that particular patient and his immediate illness but to try to restore him to health," said Doctor Draper "A sick nation, however, is made up of millions of persons, only a proportion of whom are at the time in the ordinary sense sick, but the rest of whom are constantly exposed to the danger of becoming ill The national problem, therefore, includes not only the restoration of the sick to health but the prevention of disease among those who at the time may be healthy

"The first part of this program has been left largely and wisely to the private practitioner The sick person is an individual and requires individual treatment

"The preventive part of the program, however, has been assumed to a great extent in this country by public health agencies for two principal reasons (1) That the general practitioner in America has not been trained to think and act in terms of preventive medicine, and (2) that many of the necessary measures can be applied only by the concerted action brought by a central official organization

"It must be acknowledged," he said, "that public health agencies can clearly foresee limitations to what can be accomplished by concerted action through official agencies The limits have by no means been reached, but there is no good reason for delaying the application of any potential help which would not introduce conflicting elements

"And it would appear that if the 150,000 physicians in practice in this country could be enlisted in a serious effort to improve and

* Condensation of Dr William F Draper's address on "The Unexplored Field of Preventive Medicine in Private Practice," as chairman of the Section of Preventive and Industrial Medicine and Public Health of the Washington meeting of the American Medical Association Doctor Draper is an Assistant Surgeon of the U S Public Health Service, Washington, D C

conserve the health of the millions of patients and the families of patients with whom they come into contact, a tremendous impetus could be given to the cause of preventive medicine. It would seem as if under these circumstances we should hold preventable diseases, as it were, between two millstones, the one breaking up the large lumps or masses, the other grinding away at the individual particles

"We are all aware that some not insignificant attempts have been made by members and by associates of the medical profession to increase the interest of practising physicians in the prevention of disease as distinguished from its cure. Some of these attempts have unfortunately been associated with other projects about which considerable controversy has arisen.

"I need only mention a few topics to indicate to you what is meant. Such captions as 'State Medicine,' 'Contract Practice,' 'Life Extension' can hardly be mentioned without arousing various and conflicting emotions in the minds of a medical audience. And yet, with each of the movements represented by these captions, some element of disease prevention by practising physicians has been associated. My address has nothing to do with a discussion of these factors

"The opportunities for preventive work to which I would call attention are not necessarily associated with any movement, organization or development affecting the profession. They concern the individual practitioner himself alone, and I speak as one doctor to another

NEW METHODS IN PROSPECT

"I have mentioned that limitations to what can be accomplished by official mass health work are in sight. There is still much to do in the extension and consolidation of current useful activity, and doubtless new methods will develop as time goes on, but always there will remain the fact that the collective health status of the nation will depend to a very considerable extent upon what the individual citizen does as regards his own health and that of his children.

"Extensive attempts have been made by health organizations to excite the interest of the citizen in the protection of his health. But it would appear that what would seem *a priori* to be the most fruitful

source of advice in matters of personal and domestic hygiene had in general been deplorably neglected "

Doctor Draper said that the doctor of medicine has been trained to think more about disease than about health, " but there is no more adaptable person in all the world than the doctor, and if he can be persuaded of its desirability he can soon learn to enlarge his viewpoint. The most important incentive to such an expansion of viewpoint is the opportunity for service to humanity and, secondly, the fair promise of increasing remuneration " He expressed belief that a false sense of delicacy and false interpretation of ethics have stood in the way of developments along this line, rather than the unwillingness of patients to pay for advice in advance of actual illness

" If we read the signs of the times aright," Doctor Draper said, " the time is not far distant when the public is going to demand protective advice from the doctor The time is coming, we think, when a doctor will be severely criticized for failure to offer advice on hygienic matters when he has had opportunity for making the necessary observations. His reply that he was employed to treat a case of rheumatism, not to criticize the family diet, will come to be considered as inadequate These observations may appear visionary or chimerical In support of their soundness, I submit the evidence that in other countries, further developed along these lines than we are simply because they had had longer experience, the state of things which I have sketched is already the accepted order In some instances, it goes even further The official health organization still has important functions but the bulk of the health work is done by the practising physician who is held, morally and often legally, responsible for its proper performance.

" I am not arguing for an increased official relationship between the physician and the Government I very seriously doubt its desirability I merely wish to invite attention to a great service to humanity which the profession can perform and which it seems probable that it will be called upon to extend before many years have passed

" Is the medical profession equipped at the present time to offer sound, dependable and consistent advice on all the questions of domestic and personal hygiene which may be propounded by those

seeking advice?" he asked. "Frankly," he said, "I do not see how it can be and could be expected to be"

He said little attention had been paid to this aspect of medicine in the colleges up to within the most recent years and that hardly anywhere is the formal instruction in a purely medical course fully adequate. He added, however, that many physicians are already fully equipped to take up this work.

He explained that there seems to be no good reason for limiting the scope of the activities indicated so long as the activities are kept within the subject-matter upon which a doctor can be expected to speak with authority and out of the field which is strictly the province of public health authority. The physician, he said, could examine into the sanitary condition of the home itself and call attention to obvious health hazards intrinsic therein, as well as become familiar with the physical and mental status and habits of the members of the family. On the other hand, he said, questions dealt with by local sanitary law could be referred to the health authorities.

The Public Health Service, Doctor Draper said, has felt so strongly that an immense power for good is not being adequately utilized that it desires to help along a process of evolution which, although much hindered and delayed, appears to be ultimately inevitable.

It has considered, he said, whether the publication of a "Check List of Opportunities for Domestic Health Practice" would be acceptable to the profession and in any considerable demand by it. It would seem possible, he said, with suitable counsel to prepare such a list which should be convenient for reference by doctors desirous of developing this branch of medical activity.

Referring to ways in which the practising physician could contribute more to the prevention of disease, he said, an example would be found in the old tenets of medicine, the treatment of the patient rather than the disease. This, he said, presupposes a thorough examination of the patient and the discovery of any incipient disease or predisposition which he may have besides the particular complaint which brings him to the doctor.

This would include, he said, not only the physical body but the whole man, his habits and his mental worries and how he deals with

them. Present-day training, he suggested, should be sufficient, in conjunction with the confidential relation between doctor and patient, to lay the basis for very effective work in mental hygiene, and the doctor's visit to the family opens up an immense field of potential preventive medicine

OLD-FASHIONED DOCTOR PRAISED

"It is our impression," he concluded, "that the old-fashioned doctor knew far more about his families and their members, as regards both their physical condition and their mental comfort, than is the case nowadays. Undoubtedly an enlightened return to this more intimate relationship would be better for the public and also for the doctor."

He suggested in this connection that doctors should discover defects in children of families he attends, and that family physicians attending children should recognize in the adults of the family their dietary diseases, their hernias, their tuberculosis, their mental maladjustments, etc.

"It is easy," said Doctor Draper in conclusion, "to blame it on the ignorance or carelessness of the individual, but we believe that much of this wastage could fairly be laid at the door of the physician who has neglected abundant opportunities for service, and also, we think, for legitimate and compensable medical practice"—*The United States Daily*, May 19, 1927

Seasonal Variation in Growth of Children was a paper presented by Dr. Haven Emerson, New York.* In this paper, Doctor Emerson reported on studies made in Honolulu and two cities of North America, Boston and Toronto. It was found throughout that children increase in weight very slightly, remain stationary, or drop below their previous weight, between December and April. In many instances infectious diseases, more especially influenza and measles or scarlet fever, developed soon after this loss in weight began. It was not always apparent whether this loss in weight was the cause or the effect of the inter-current disease, though the impression gained by the curves was that the diseases took hold when the child had been reduced somewhat by possibly climatic influences, though

* Abstract of paper read in the Section on Preventive and Industrial Medicine and Public Health, May 20, 1927

Doctor Emerson was of the opinion that fatigue produced by the mode of living in winter, school, social activities, and wrong living were at fault. The girls throughout showed more decrease in weight during these winter months than the boys. In some of the detailed curves there was another slight drop, or lack of increase, in the month of August, the curve after that going upward markedly. Following this paper, Dr. Henry D. Chadwick, of Massachusetts, presented a study on underweight clinics in the schools of Massachusetts. In this paper he showed that tuberculosis played a considerable part in the arrest of development of the underweight pupils.

Venereal Diseases at the Scientific Assembly of the American Medical Association, 1927, Washington, D. C.—The endeavor made to control the venereal diseases, which has continued for centuries, had received renewed impetus since the recent war. Evidence of these endeavors was met with at the Washington meeting of the A. M. A. Not only were many lectures devoted to the subject at meetings dealing with dermatology and syphilology only, but it was distributed over the programs of the various sections. In former years it was generally limited to the sections of dermatology and urology. At this meeting it was taken up by general medicine, neurology and psychology. It was not represented at the section on preventive medicine and public health. A meeting, however, was called under the auspices of the Surgeon General by the Division of Venereal Diseases at Washington, to gain the cooperation of the first men of the country in venereal diseases. This was done in an attempt to make the activities of the Division of Venereal Diseases more effective. The division had been created at the time of emergency, during the war, and has carried on its activities in the civil population since then.

The leading principals in therapy at the meetings were represented by Dr. John H. Stokes, Dr. Paul A. O'Leary, Drs. H. N. Cole and Carl S. Wright, and others. The arsphenamins still predominate, though bismuth has gained ground, especially in congenital syphilis. Schamberg reports that he uses it extensively for children, who endorse his method, because it is not as painful as mercury and arsphenamin preparations. Tryparsamid is sustained by a number of clinicians, especially in the tertiary stage. Mercury and the iodides ever and anon are defended by some of the older as well as

the younger men of the profession. It is conceded that malaria treatment is, at present, the most effective in reducing mortality rates and producing remissions. Remissions are gauged by O'Leary entirely by the economic reestablishment of the patient.

Among the diagnostic tests, only few were in evidence. Dr. Lester Hollander, of Pittsburgh, reported on organic luetin tests. In 1915 Doctor Chesney made syphilitic and non-syphilitic tests, and found out that it was not successful where iodine medication had preceded. The difference in effect between organic and cultural luetin was pointed out by Dr. John A. Kolmer. The cultural luetin, he stated, had not verified what Noguchi expected. The skin of a syphilitic has a tendency to react to non-specific stimulants. Doctors Greenbaum and Kolmer made a cultural pallida luetin, and found that a negative reaction by it was not decisive. Doctor Kolmer doubts that *Spirochæta pallida* has—so far—been cultivated at all. He does not think that the luetin test equals the complement fixation test. Doctor Stokes pointed out in the discussion that psoriatic lesions cause a reaction, which is a proof for the non-specificity. The organic luetin used by Doctor Hollander is prepared of syphilitic lung, spleen or liver, macerated with water, phenol being added. It is injected into the skin, and the reaction occurs within 24 to 36 hours, and persists up to 72 hours in positive cases. In his diagnostic tests he found that a certain therapeutic action was exerted by the luetin extract. He considers it especially useful as a diagnostic measure in tertiary syphilis.

At various times contradictory statements have been made regarding the effect of pregnancy upon the development of neurosyphilis. The fact that in many communities and races neurosyphilis develops four times as often in men as it does in women, has led to the query whether the main distinction between man and woman might not have an influence upon the later course taken by syphilitic infection. Several clinicians have stated that pregnancy saves women and their nervous system from general paralysis and tabes, and that the repeated abortions occurring in syphilitics, in some not clearly defined way, may take some of the venom out of the system. Others have shown up the very opposite, namely, that the excitement of the body under the stress of labor produces a detrimental effect upon the

nervous system of those already weakened by a syphilitic infection. Some authors have changed their viewpoint in the course of their studies on the subject. Dr. George H. Belote, of Ann Arbor, in his paper on "Pregnancy and Neurosyphilis," presented some results gained by inoculation of rabbits, which were pregnant. He did not find much difference between the pregnant and non-pregnant rabbits. In the human he had found that high fever during the first year of syphilis was likely to occur in those who did not develop neurosyphilis later. The explanations given by many authors who sustain that pregnancy protects from neurosyphilis, have been along the lines of chorionic ferments. Doctor Belote finds that pregnancy does not protect from neurosyphilis, as other writers have found. Recamier found that a relighting of latent syphilis occurred during pregnancy. A five-year study has led Doctor Belote to differentiate between an invasion and involvement. He believes that a positive reaction of the cerebrospinal fluid is not always indicative of neurosyphilis. He did not find much difference between the incidence of cerebrospinal fluid changes in men and women, nor much difference between pregnant and non-pregnant late neurosyphilitic women. A cerebrospinal fluid invasion is seen in early syphilis.

In a paper entitled "The Third-year Results with Malaria Therapy of Neurosyphilis," Doctor O'Leary presents the studies made on the treatment of general paralysis, tabes, optic atrophy, and other forms of neurosyphilis. He does not unreservedly advocate malaria treatment, and is not using it for early syphilis. The percentage of slight improvement was 17. There were two clinical relapses, and two long remissions. The serological improvement was not marked. In nine there was a complete reversal, both of the cerebrospinal fluid and the blood reaction. Eighteen patients aborted the malaria, but the clinical improvement did not differ materially from those who took the full course of malaria treatment. Doctor O'Leary considers malaria therapy a useful and easy therapy, but a non-specific protein was often used to reestablish pyrexia, where malaria had been aborted. There were nine deaths among a hundred treatments, three of which were indirectly attributable to malaria. One patient died from meningitis, and a pure paresis was seen in one instance, where the case ended fatally, and where no spirochetes

were found after malarial treatment : This is a point which needs further investigation Tryparsamid administered after a course of malaria has been given will improve the serological findings The indication for malarial treatment is parenchymatous neurosyphilis In the discussion, Doctor Cole, of Cleveland, expressed himself enthusiastically regarding results made by his clinic, with 200 malarial treatments. Tabes of severe type was entirely restored. One of the patients had been obliged to stop work for months, and was able to take up his former occupation Low blood-pressure—14 to 16 to 18—in his opinion, forms an indication. He found urea was rarely considerable, without other causes being present Only one patient of his last one hundred died. Doctor O'Leary thinks that more intraspinal treatments should be encouraged He finds remission in 50 per cent. of the non-parenchymatous involvements His gauging of remissions on an economic basis is brought to a very fine point. Wherever the patient is not able to resume his former work, or has to take work commanding less pay, the case is not considered a complete remission

Doctor Webb pointed out that malaria treatment had been used in olden times by the Romans, who went to the Campagna to be restored by taking malaria in the swamps of that region.

Dr J E Moore, of Baltimore, is an advocate of tryparsamid in optic atrophy, or at least does not consider it a contra-indication to its use which is so considered by many other clinicians He thinks that though the application of tryparsamid affords some danger in this type of patients, they are in need of intraspinal treatment He believes that tryparsamid is excellent in early syphilis, and malaria in light paresis and perennial tabes He has 14 per cent improvement in tabes from intraspinal therapy In the discussion, Dr L M. Gaines, of Atlanta, stressed early examination of the cerebrospinal fluid He thinks that it should be made soon after the first treatments for early syphilis Dr Homer F Swift believes that the cerebrospinal fluid should be titrated before the Wassermann reaction is made He believes that it is not possible to use the routine classification of neurosyphilis, that more individual distinction and also pathological separation should be made He still adheres to the methods which he and Swift-Ellis introduced in 1912 He

does not believe, however, that it should be used as a routine treatment. The iodides should not be discarded, he thinks, for various cases of tertiary syphilis. The saving of the optic nerve he considers an indication for the intraspinal treatment, tryparsamid is dangerous in these cases. Doctor Moore believes that the Swift-Ellis method is advisable in tabes, while in early paresis, tryparsamid should be given preference. Recently, rat-bite fever has been used in Baltimore. The meningovascular involvements have been serologically improved in 67 per cent., and some of these cases have been under observation for more than two years.

Medicine

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DIAGNOSIS OF NERVE SYPHILIS IN THE ABSENCE OF A POSITIVE SPINAL FLUID

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LABORATORY tests cannot take the place of a careful observance and proper interpretation of clinical signs, in the diagnosis of nerve syphilis. The laboratory technic of to-day is highly developed, and the importance of laboratory reports in diagnosis is not denied. But the physician is unwise who depends upon them in the diagnosis of nerve syphilis, to the disregard of clinical signs. Even the most painstaking laboratory technic should not influence the physician to feel too certain that a negative spinal fluid indicates the absence of nerve syphilis. There are still many puzzling things in the field of biochemistry. We know how to carry out the Wassermann test and how the various agents used in the test behave, but we cannot yet be sure just why they behave as they do. This being the case, all has not yet been said about the Wassermann test. The cerebrospinal fluid may vary in its reactions when taken from the ventricles of the brain, from the cisterna magna, and from the lumbar sac. In these instances the cell-count may vary also, as may the globulin.

In his work on syphilis, speaking of the Wassermann test, Thom says, "Although used all over the world as a diagnostic procedure par excellence in syphilis, the exact nature of the reaction is still unknown.

The intricacy of the test and the various equations—personal and other—which enter into it, undoubtedly militate to a very great extent against the accuracy which should obtain, and give rise to the discordant results, which in some instances amount to deplorable errors more frequently than is usually supposed."

It has been shown by various authorities that from 20 to 40 per cent of tertiary syphilitics have isolated neurological signs of nerve syphilis in combination with negative spinal fluids, which fluids often remain negative after treatment

The purpose of this paper is to urge upon the general practitioner, the neurologist, and the industrial surgeon, the great importance of looking beyond the spinal fluid test in the diagnosis of nerve syphilis, also to bring to the attention of adjusters for insurance companies, employers of labor, industrial accident commissions, and all who are concerned with syphilis in its economic and social aspects, the fact that a negative Wassermann is no proof of the absence of nerve syphilis

In the practice of industrial medicine, two evils arise when an erroneous diagnosis, based on a laboratory report of a negative spinal fluid, is submitted to the Industrial Accident Commission or to a casualty insurance company. When a case of nerve syphilis is overlooked because of a negative spinal fluid, an unjust burden is placed upon the employer. He is compelled to pay compensation fees to an individual whose chief difficulty is syphilis and whose industrial injury may have been trifling. No less important is the injury done to the employe by such an erroneous diagnosis. He receives his award for disability, to be sure, but if his disease remains untreated his future is shadowed and, possibly, his life threatened, his future earning power is reduced or cut off altogether. For there is no surety that symptoms of the disease, temporarily latent, may not again become active.

Just why practitioners and diagnosticians should hesitate to concede that late syphilis may not exist in the absence of a positive spinal fluid, it is difficult to understand. When we see persons with visceral syphilis, or syphilis of the osseous system, or with the lesions of skin syphilis, we do not hesitate to diagnose their cases as syphilitic nor to treat them as syphilitics, even though the Wassermann of the blood and spinal fluid is negative.

The physician comes in contact with patients who at one time have positive spinal fluids, and who within a few months or years may show a negative spinal fluid without the intervention of any treatment whatever. It has been noted that in some cases where the spinal fluid is positive in the secondary stages, it becomes negative and remains so over long periods of time without treatment. Yet such a case will show typical symptoms of tabes dorsalis, cerebrospinal syphilis, or various forms of nerve palsy. These cases have

been referred to as "burnt-out" or abortive types of nerve syphilis. It has been held by some authorities that in cases of cerebral syphilis with spinal cord involvement, the spinal fluid is very frequently negative. Or there may be a patient who has a chancre scar, and gives a history of the secondary eruption and its disappearance, and who has had a more or less prolonged and effective course of treatment which he discontinued when all the manifestations disappeared. Such a person presents himself to the physician for diagnosis after he has some accident or a syphilitic insult to one of the cranial nerves. He has had sufficient treatment to change the body fluids so that the spinal fluid test gives a negative reaction. Yet examination will disclose that he has ptosis of one eyelid, or a bilateral or unilateral deafness (syphilis of the eighth nerve) or that he suffers from intense nocturnal headaches, or attacks of dizziness, or numbness of his hands and feet, or defective control of the urinary bladder. In this type of case we may find a negative Wassermann of the blood as well as of the spinal fluid, yet the history of the whole case is one of syphilis.

In another type of case we have syphilis of the blood-vessels of the nervous system, manifested by such conditions as thrombosis and hemorrhage, arteritis obliterans and aneurysm, and associated with these conditions in syphilis of the blood-vessels of the brain there will be syphilis of the heart-muscle and syphilis of the aorta. Many cases of so-called angina pectoris, if carefully examined, present the lesions of nerve syphilis. A multitude of these cases give a history of syphilis as clear as that cited in the preceding paragraph. When they do not, and the syphilis is not recognized and treated, the patient is the loser. It is true that in vascular syphilis or syphilis of the blood-vessels of the brain there frequently is a positive spinal fluid, on account of the marked inflammatory reaction which occurs in these conditions, but not always. When the condition becomes chronic the active syphilitic processes tend to subside, resulting in a negative Wassermann reaction of the blood and spinal fluid.

The greater number of negative spinal fluids in neurosyphilis occur in those cases where the blood-vessels of the brain have been chiefly affected, and in this type we find usually a marked increase in the number of cells in the spinal fluid.

We occasionally find a negative Wassermann of the spinal fluid in gumma of the brain and syphilis of the cranial nerves, in tabes dorsalis, in syphilitic epilepsy, in Erb's syphilitic spastic paraplegia, in so-called syphilitic paranoia and syphilitic neurasthenia, and very rarely, in the terminal stages, even in general paresis

We seldom find a negative Wassermann of the spinal fluid in patients who have never been treated, and frequently we find that the negative reaction in nerve syphilis becomes positive after a definite course of treatment.

There are three forms of tabes which have negative spinal fluids. These are, first, the abortive forms in which there is for some reason or other a cessation of the active pathological process. In the second group the spinal fluid becomes negative under active treatment. The third group consists of those cases in which tabes is incipient and the patient presents symptoms of irritation only. A number of cases will show only a mildly positive Wassermann reaction of the spinal fluid. They are the links which fill the gap between the cases of tabes with a frankly negative Wassermann and those with a frankly positive Wassermann.

In some cases where the disease process is not stubborn and resistive to treatment the spinal fluid becomes negative after a very small amount of treatment is given. Many times, in tabes, the spinal fluid becomes negative after treatment, although there is no improvement in the clinical symptoms.

In some of these cases of nerve syphilis the Wassermann of the blood remains positive, the symptoms of nerve involvement are pronounced, but the spinal fluid remains negative. Should such a patient be pronounced free from nerve syphilis merely because his spinal fluid is negative, when his knee-jerks are absent, when he has a positive Wassermann of the blood, Argyll-Robertson pupils, and a ptosis of one eyelid?

Nonne groups five types of cases of neurosyphilis in the absence of a pathologic spinal fluid, as follows

"(1) The fluid is, from the beginning, normal

"(2) The fluid, in the beginning pathologic, becomes normal. This is a healed syphilitic disease of the central nervous system.

"(3) The fluid shows improvement over its former condition but

is still not entirely normal In this condition the disease process is improved

"(4) The fluid is still pathologic as it was earlier, but the clinical picture has remained stationary.

"(5) The fluid remains pathologic as it was formerly, with an increase in the disease process"

Following are cases that have come under the personal observation of the writer, all undoubtedly syphilitic, but with negative spinal fluids

Syphilitic Epilepsy—A man, thirty years of age, who served in the late war He spent most of his service in an army general hospital, and at that time had a positive Wassermann of the blood He was discharged with a surgeon's certificate of disability He was subsequently employed by a large corporation which sent him to the writer for diagnosis, with a history of having had three definite convulsive attacks in the previous year During these convulsions he lost consciousness completely The attacks lasted about five minutes, after which he was dazed and stuporous or fell into a profound sleep lasting two or three hours. A neurological examination revealed unequal pupils, both pupils responding slowly to light. Abdominal and cremasteric reflexes were absent on both sides Elbow- and wrist-jerks were diminished and unequal Patellar reflexes were altogether absent There was a slight Romberg The patient complained of terrific headaches at night and frequent attacks of dizziness The Wassermann of both the blood and the spinal fluid was negative Cell-count was ten

Syphilitic Epilepsy—The patient served in the navy during the war and was discharged on a surgeon's certificate of disability He had had about thirty convulsions Had suffered severe burns through falling into a fire during a convulsive attack. He complained of excruciating nocturnal headaches, lightning pains in the limbs, and numbness of the hands and feet. The neurological examination disclosed unequal pupils, diminished and unequal elbow- and wrist-jerks, absence of patellar reflexes, and scattered spots of anaesthesia over both legs below the knees Had had a history, in the service, of syphilis, with a positive Wassermann Had had a very limited amount of treatment. Had a scar on the glans, due to a venereal sore. He refused medical treatment for two or three years, during which interval the convulsive attacks were more frequent His spinal fluid was negative Wassermann of the blood was negative at the time of most recent examination (January, 1927) Since that time the patient has resumed anti syphilitic medication and has had but one convulsive attack in three months His headaches have disappeared and his general health has improved.

Neurovascular Syphilis—The patient gave a history of having had a chancre and more or less indifferent and intermittent treatment. At the time of his first examination he had a negative Wassermann of the blood and spinal fluid Cell count of spinal fluid was 18 Globulin test was positive The patient agreed to take anti syphilitic treatment but postponed it from time to time and presently developed a right sided hemiplegia involving the face, arm and leg For several

days after the development of the hemiplegia the patient was unable to speak intelligibly, or to move his arm or leg. He was given a course of neo-salvarsan and potassium iodide, and the clinical symptoms cleared up at once. He remained in a fairly good state of health for about two years, during which he was very neglectful of his treatment. He then developed nocturnal headaches and syphilitic iritis and complained of terrific pains about the heart, and eventually died in an attack of angina pectoris. This was a clear cut case of neurosyphilis of the cerebral vascular system, attended by syphilitic disease of the aorta, yet at the time of first examination there was a negative spinal fluid.

Cerebral Syphilis, Interstitial Type—The patient had suffered from severe headaches for several months. One day the patient became involved in a heated argument with a casual acquaintance over a trifling matter, became very much excited and angered, and struck several of his very best friends who attempted to restrain him. He was arrested and taken before a lunacy commission and committed to a psychopathic hospital. At the time of his admission to the hospital he was in a dazed condition, confused, extremely suspicious and paranoid, and had olfactory hallucinations—thought he smelled vile odors. He was in state of extreme irritability and attacked and severely injured a hospital attendant. Before his spinal fluid test was made his case was diagnosed by the hospital attachés as general paresis. They were intent on committing him to the state hospital for the insane. The writer was called in consultation to examine the case. The neurological examination disclosed irregularity of the pupils, unequal and exaggerated patellar reflexes, and spots of anæsthesia below the knee. These signs, together with the patient's marked state of confusion and excitement, caused the writer to make a diagnosis of syphilis of the interstitial type. The result of the Wassermann test of the blood was positive, that of the spinal fluid negative. The cell-count of the spinal fluid was 72. The patient was put on very active anti syphilitic medication, sedatives, and hydrotherapy. The excitement and confusion, irritability and headache disappeared at once, the Wassermann of the blood became negative, and the cell-count dropped to thirty.

Cerebrospinal Syphilis—This case gave a history of acquired syphilis, had a chancre scar. Received fairly good treatment about fifteen years earlier, at time of infection. Suddenly developed a right toe drop and a condition of anæsthesia on the right leg below the knee, a sensation of numbness along the distribution of the right ulnar nerve and a feeling of uncertainty when walking downstairs or in the dark. Complained that his feet did not "track right." The examination revealed inequality of the pupils, sluggish reaction to light, absence of the abdominal and cremasteric reflexes, diminished elbow- and wrist jerks, very greatly diminished and unequal patellar reflexes, and a slight unsteadiness while in the Romberg position. Walked unsteadily with his eyes closed. Over shot the mark when doing coördination tests with his eyes closed. Wassermann of the blood and spinal fluid negative. Cell-count of spinal fluid seven.

Locomotor Ataxia with Complete Optic Atrophy—Gave a history of having acquired syphilis twenty five years earlier. Received mercury by mouth and by injection and with the advent of salvarsan took twenty treatments. The patient developed the symptoms of locomotor ataxia about five years prior to the examination, which was made in December, 1926. He had Argyll Robertson pupils, his knee-jerks were totally lost, and he had no control of the urinary bladder.

(had worn a urinal for three years) About eighteen months ago, after the usual neurological signs were complete, he began to notice that his vision was defective At the time of examination his sight was completely gone There was a condition of complete optic atrophy The Wassermann of the blood was weakly positive, the spinal fluid was negative, and the cell-count was fifteen

Syphilis of the Seventh and Eighth Nerves—There was a history of syphilitic infection, with more or less perfunctory and intermittent treatment. The patient consulted the writer on account of a paralysis of the left seventh nerve. The physical examination revealed the usual facial signs of Bell's palsy The pupils were unequal and responded slowly to light. The elbow- and wrist jerks were increased and active. The patellar reflexes were unequal and very much increased There was total deafness of the right ear, which had been present, the patient stated, for about six years The Wassermann of the blood and spinal fluid was negative, the cell-count was twenty The patient was put on active anti-syphilitic medication and sodium iodide intravenously, and the facial paralysis disappeared very rapidly There was no improvement in the hearing

What symptoms are necessary for the diagnosis of nerve syphilis in the absence of a positive spinal fluid? No one particular symptom is to be depended upon for such a diagnosis It is the sum total of all the symptoms that makes the diagnosis possible However, there is one symptom which is very strongly suggestive of syphilitic involvement of the central nervous system, and that is the Argyll-Robertson pupil There are many other eye symptoms which we find in nerve syphilis, such as inequality of the pupils, irregularity in the outlines of the pupils, sluggish reaction to light and a failure of the sympathetic and consensual pupillary reactions True, these conditions are met with in other pathological states besides syphilis But should we find the pupil which does respond to distance and not to light, we must assume that syphilis is present until it can be ruled out.

There are combinations of symptoms—various symptom complexes—that are strongly suggestive of nerve syphilis Among these are palsies of the cranial nerves, such as slowly increasing deafness which may be lateral or bilateral, disorders of speech such as dysarthria, aphasia, gymnastics of the muscles of the face; an exaggeration or inequality of the deep reflexes, the Romberg sign, anæsthesia of the legs below the knees, anæsthetic spots in various parts of the body (these latter to be distinguished, of course, from sensory symptoms of hysteria) Other symptoms are poor sphincteric control or total loss of sphincteric control, attacks of dizziness, fainting spells and convulsions, nocturnal headaches,

sharp, shooting pains throughout the body, gastric attacks which have no relation to the taking of food. Besides these there is a host of other symptoms not so important. When we find combinations of these symptoms we must suspect syphilis, and other diagnoses are not to be made until syphilis has been ruled out. When these symptoms occur singly or in combination in a person whom we know to be syphilitic, we must conclude that the central nervous system has been invaded. Given a careful analysis by one who is thoroughly conversant with the fundamental principles of neurology, a diagnosis of nerve syphilis can be made without a positive Wassermann of the blood or spinal fluid.

CERTAIN PROBLEMS OF PROSTATIC HYPERTROPHY

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Prostatic hypertrophy is a common disorder. According to statistics published by Thompson and Guyon, the condition occurs in 34 per cent. of men reaching the sixties. Of those only 50 per cent. offer symptoms of obstruction. The normal prostate weighs 15-20 grams. In hypertrophy, the weight may be increased to 80 grams and more. A specimen reaching 288 grams has been described. Such an increase in size and weight of an organ in advanced age has baffled many investigators and a vast literature grew up on the problem.

In recent years our notions concerning the pathology, development, symptomatology and treatment of prostatic hypertrophy have undergone considerable changes. In the following, an attempt is made to summarize the modern conception and such conclusions as are borne out by personal experience.

PATHOLOGY OF PROSTATIC HYPERTROPHY

Prostatic hypertrophy is a misnomer. It is neither true hypertrophy nor prostatic in origin. It is a hyperplastic process, arising from certain glandular structures which are located between the verumontanum and the internal sphincter. Those glands have been described under various names, as rudimentary, central, submucosal, and peri- or suburethral. Albarran was the first to mention the rudimentary central group of prostatic glands. Motz and Perearnau in 1905 ventured the opinion that prostatic hypertrophy takes its origin from the suburethral glands.

According to newer investigations, there are two strata of rudimentary glandular structures located centrally to the fully developed prostatic glands. The very short and simple "urethral-mucosal" glands and the somewhat longer and more branched "submucosal" glands which are covered by the mucosa of the urethra. The latter are considered the potential and substrate of prostatic hypertrophy. There are similar subcervical and subtrigonal glands which may like-

wise undergo proliferation, but they are a process *sui generis*, and should not be confused with prostatic hypertrophy

The rôle of the prostatic glands proper is rather of a secondary character. The proliferating masses compress what was originally the prostate and the latter forms the so-called surgical capsule, which may vary from $\frac{1}{2}$ cm. to a few mm in thickness. This capsule retains the anatomical structure of the prostate, in miniature. It has the faculty to regenerate in a few months following prostatectomy and one may find then an almost normal prostate, capable of producing normal prostatic secretion. Prostatic hypertrophy may include smooth muscular fibres and connective tissue, but the glandular element predominates. Secondary inflammatory changes or like processes may give rise to muscular fibrotic proliferation, but the majority of prostatic hypertrophy is composed largely of glandular tissue.

The origin of prostatic hypertrophy is far from being settled. The inflammatory theory by Ciechanowski, the arteriosclerotic by Guyon, the sexual by White and Ramm, and the neoplastic by Blum and others, could not be reconciled with our present-day clinical experience. The newest and most plausible theory is that of Simmonds. According to this writer, the prostate undergoes pre-senile atrophic changes similar to those observed in other organs in advanced life. This is counterbalanced by hypertrophy of the above-mentioned rudimentary suburethral glands. Internal testicular secretion may act as additional stimulus (Leugeu, Nemenoff). Certain hereditary tendencies and constitutional factors are likewise of importance. Constitutionally, the condition seems to be more prevalent in the digestive type of Sigaud. The majority of this type of patient are of medium height, flabby, overweight and over-nourished with a soft skin and smooth texture, large abdomen, broad lower jaw and emphysematous chest. Temperamentally, they seem to respond to the cyclothymic type of Kretschmer. Prostatic hypertrophy rarely combines with diabetes and tuberculosis.

THE MECHANISM OF PROSTATIC HYPERTROPHY

Prostatic hypertrophy is not a disease *per se*. The changes in the neighboring organs are responsible for whatever clinical pathology there is. The mechanism of those changes is the most important feature of the pathological process.

The expansion of the proliferating glands encounters several mechanical hindrances. Towards the perineum, firm structures of the urogenital diaphragm present an insurmountable barrier. Posteriorly, the prostatic gland offers resistance which may not be easy to overcome. The proximal limit is the verumontanum. It is being pushed away by the growth for some distance, but the structures of the external sphincter do not permit for much further expansion. The direction of the growth tends, therefore, on the line of the least resistance, which is upward and cranialwards. This causes two of the most important changes in the pathology of prostatic hypertrophy affecting the structures of the internal sphincter and the prostatic urethra. From the degree and the direction of these changes depend the manifestations of uropathic complications. There are two types of prostatic hypertrophy with relation to the sphincter.

(a) *The Intravesical Type*—The glandular masses growing towards the bladder interpose between the mucous membrane and the muscular structures of the internal sphincter. The sphincter is dislocated. The muscular fibres are being stretched and encroached upon. The orifice is raised above the floor of the bladder and pushed into the lumen. First, there is a derangement of the posterior portion of the sphincter and later, also, the lateral portions are being dislocated. The anterior part is left free in the majority of cases. The forms, which the tumor masses can assume in relation to the sphincter, vary. There may be a so-called middle lobe formation with a valve-like action, or the orifice may present a small longitudinal cleft between the masses encroaching from both sides, or the whole sphincter may be walled in, projecting a picture similar to the cervix of the uterus. On the other hand, one or two of the lateral lobes may be developed asymmetrically, presenting various forms of lateral or bilateral encroachment. The sphincter, as a whole, assumes a more or less oblique direction.

(b) *The Subvesical Form*—From the above type of intravesical intrusion, the subvesical form should be differentiated. In this form there is no direct growth of the masses into the bladder. The base of the bladder is raised *in toto*. The orifice and the sphincter muscles remain unchanged in their mutual relationship. The obstruction is urethral and not sphincteric. The urethra bears the brunt of the

changes caused by the growth. The part which can be moulded in different shapes and sizes is the segment located between the ejaculatory ducts and the internal sphincter. The floor of the urethra with its glands will necessarily undergo most of the changes, while the roof of the urethra exhibits more secondary and relatively insignificant modifications. The urethra undergoes stretching and elongation, varying between 1 to 4 cm. and going up to 3 to 4 inches in selected cases. The posterior wall of the prostatic urethra will be more elongated than the anterior, giving rise to a disproportion in the antero-posterior diameter and distortion of the normal curve of the urethra. The verumontanum, being fixed, forms with the more distal parts an obtuse angle. There is, likewise, a more or less deep excavation at the base of the bladder sphincter. Ingrowth of the masses into the lumen of the urethra may cause additional protrusions and dilatations of its walls. In consequence, the urethra may become tortuous or S-like in its course, with as many pockets and blind sacs as there exist projections of the growth. This explains the presence of so-called pseudo-strictures in prostatics calling for great care in catheterization. Fibrosclerotic changes in the muscular coats of the urethra impairing their elasticity and gradual weakening of the external sphincter are the end-results of prostatic obstruction and intra-urethral encroachment.

THE BLADDER

The following changes are secondary manifestations of chronic obstruction. They are not specific for prostatic hypertrophy. They may appear in any kind of obstruction. In cases of intravesical intrusion, there is a deep pouch behind the sphincter harboring residual urine (recessus retroprostaticus). In both types of prostatic hypertrophy there is an obstacle to intermittent evacuation of the bladder. The bladder muscle is striving to restore the balance disturbed by the presence of obstruction. The result is overgrowth of muscular tissue. The detrusor muscle develops from tiny strips to a powerful criss-cross framework of elevated ridges and bands. As a rule, there are stronger trabeculations of the posterior wall and lesser in the fundus of the bladder. This is due to unequal division of work between the segments of the bladder. In between the trabecula-

tions there are shallow sacculations and larger diverticula. Usually, all structures of the bladder wall are involved in this formation, but quite often one may encounter excavations of the mucous membrane covered by a thin layer of degenerated muscularis or by serosa only.

The trigone participates likewise in the process of bladder adaptation. It differs from other parts of the bladder in its anatomical development and functional peculiarities. Accordingly, the changes observed in this structure bear a special character.

In prostatic hypertrophy, the trigone may be raised *in toto*, dislocated and shortened in response to the various forms of prostatic encroachment. The ureteral orifices may be found hidden in the retro-prostatic recess. The interureteral ligament may approach the bladder outlet. The trigone muscles have their special function in aiding in the automatic concentrations of the bladder outlet and facilitating the emptying of the ureters irrespective of the amount of urine present in the bladder. Those muscle-fibres undergo, likewise, hypertrophy. In normal cases, the upper edge of the trigone is barely noticeable in the form of a fine ridge. In chronic retention, that ridge may develop into a prominent barrier. This is caused by overgrowth of the interureteral muscle. In other cases, the lateral ridges may become likewise prominent, so that the whole trigone stands out conspicuously, dividing the bladder into several distinct pouches. All this is due to active muscular reactions in order to overcome obstruction.

However, the stage of active adaptation is sooner or later followed by signs of passivity and lack of resistance. The bladder muscles weaken down through overwork, malnutrition and other regressive changes and are unable to cope with the arduous task. In time, muscular activity ceases to be a factor in micturition. The bladder is distended like an atonic sac and harbors enormous amounts of residual urine. Thanks to a certain automatic process of adjustment, the sphincteric muscle may give way from time to time, emitting a jet of urine (*ischuria paradoxa*).

In accordance with the anatomico-pathological changes, the clinical picture can be divided into three stages.

The first stage is characterized by muscular derangements of the sphincter. There is more or less constant irritation due to pressure of the invading growth on the structures of the sphincter accompanied

by frequent desire to urinate, especially in the morning when there is more congestion than usual. The patient has to press more vigorously to get his urine through the vesical outlet. There is lack of force in the stream and terminal dribbling. This is the stage of pseudo-obstruction. Certain neuromuscular reflexes, lack of elasticity and of proper adaptation of the muscles of the posterior urethra make it difficult to keep open the urethra in order to facilitate micturition.

The second (the active) and the third (the passive) stages are those of direct obstruction. The symptoms do not always correspond to the size and shape of the growth. Of far more importance is the position and the relation of the growth to the urethra and to the sphincter. Small growths may give considerable obstruction and *vice versa*. Leueu, in explanation of this apparent paradox, assumed the existence of a special prostatic hormone which exerts its influence on the neuromuscular structures. One does not, however, have to go so far, if one takes into consideration the configuration of the posterior urethra and the variability of factors which enter into display in this kind of involvement.

THE MECHANISM OF BACK-PRESSURE

It has been generally accepted that back-pressure is due to urinary stasis. However, the purely mechanical viewpoint of bladder distention forcing its way up to the ureters and into the renal pelvis has no anatomical grounds. It is not the residual urine in the bladder that establishes what we call back-pressure. There is no indication of forced regurgitation. Up to the late stages of prostatic hypertrophy, the ureteral orifices may appear as contracted, pin-point openings indicating perfect closure. The bladder muscle in action supports the sphincters of the ureteral orifices in their cut-off function. In consequence, there may be predominance of renal symptoms at a time when reflux cannot be demonstrated cystographically or otherwise. Evidently, there are other factors responsible for the results of back-pressure.

Tandler and Zuckerkandl have demonstrated that while the pre-vesical part of the ureters undergoes hypertrophy and dilatation, the intramural part remains rather elongated and constricted. The area between dilatation and stricture of the ureters is well defined and

easily demonstrated on post-mortem specimens. At the junction of those two areas lies the obstruction interfering with the passage of urine. The ampulla-like dilated ureters above the bladder harbor residual urine. A kink at the uretero-vesical junction may still more complicate matters. The ureters dilate and their muscular coat hypertrophies. In cases with ureteral stasis of long standing, there is later on gradual loss of elasticity and thinning out of the ureteral walls, a process similar to the one observed in the atonic bladder. All those changes are caused not by direct pressure of bladder residual, but by certain processes observed in the ureters proper.

Normally, the orifices of the ureters are found at the ends of the interureteral ridge. With increasing obstruction, the interureteral ridge may appear enlarged and extend far beyond the orifices, the extension reaching twice the normal distance, in selected cases. Histological examination of excised specimens reveals that the above described condition is not due to hypertrophy of the interureteral ridge alone, but to elongation and extension of the intramural parts of the ureters beyond the limit of the orifices. The so-called interureteral ligament does not permit of further expansion while the terminal segment of the ureters can be more easily moulded. Elongation of those parts in association with the alterations in their direction and in addition to the muscular changes of the trigone is mostly responsible for the process of ureteral stricturation. Strangulation of the ureters by the crossing of the vasa differentia due to alteration of their relative positions, as described by Tandler and Zuckerkandl, may be another factor complicating the vicious cycle.

THE KIDNEYS

Back-pressure damages the kidney substance. The ureters and the renal pelves are less elastic and less adaptable than the bladder. They have a limited capability to store up residual urine. They increase their capacity at the expense of the softer renal tissues. At first, there is gradual dilatation and clubbing of the calices (nephrectasis). This is followed by congestion and atrophy of the epithelial cells of the canaliculi. The tubular system is being damaged and with it the ability of the kidneys to concentrate the urine, hence, polyuria. Elimination of the toxic metabolites can be accomplished in dilution only (hyposthenuria). The necessary fluids are supplied from

without (polydypsia) and from within (cachexia) The needed water supply is drained off from the tissues (tissue dehydration). The typical symptoms of renal insufficiency, like thirst, dry throat, coated tongue, bitter taste in the mouth and dislike of solid foods, especially meat, are due mostly to drying up of the saliva. Nausea and partial constipation, dry skin and rapid loss of weight are other instances of dehydration of the body Loss of the body fluids and increased viscosity of the blood decrease the oxygen-carrying power of the red blood-cells Toxic absorption from a distended, or an infected, bladder and from gastro-intestinal stasis, decrease the threshold of kidney elimination beyond the purely anatomical kidney changes However, the process is not limited to the tubules only The glomeruli follow suit and a preexisting or coexisting interstitial nephritis and arteriosclerotic changes may increase the difficulties of renal secretion. Finally, the kidneys may be transformed into a more or less uniform sac or several cavities filled with fluid of low specific gravity (hydronephrosis) or pus (pyonephrosis) covered with a small margin of tissue remnants Those tissue islets sustain the life of the patient within certain limits The slightest change in the equilibrium may suffice to unbalance the weak mechanism of disturbed kidney elimination.

RENAL FUNCTIONAL TESTS

The determination of the functional ability of the kidneys is of prime importance for the prognosis and choice of the proper therapeutic procedure. The degree of retention of the waste products of the body in the blood is taken as an index of impaired elimination The estimation of nitrogen bodies in the blood is the task of blood-chemistry Normally, there is a concentration of from 25 to 30 mg urea-nitrogen per 100 c.c. of blood, creatinin amounts to 1 to 2 mg and uric acid 1 to 3 mg per cent The urea index of the blood is inaccurate, its concentration being dependent upon such extrarenal influences as the quality and quantity of the food ingested and the time intervening between the meals and the examination performed Uric acid gives the first sign of nitrogen retention However, its excess may be due to faulty elimination, as well as to increased production The coefficient of Ambard, being a comparison of the concentration of urea in the blood and in the urine, at the same time, is

of more exact value. Fifty mg per cent. of non-protein nitrogen in the blood indicates the safety limit above which prostatectomy should not be attempted

In cases of impaired elimination, there may be retention of sodium chloride preceding the retention of nitrogen and the estimation of plasma chlorides deserves more attention than is usually given to it. Kryoscopic blood examination is of great importance. Normally, the freezing-point of the blood-serum is around 1.56°C . In functional disorders of the kidneys, it amounts between 0.60° – 0.65°C and more. The presence of indican in the blood is likewise of significance. Indicanæmia may precede azotæmia. The retention test is to be supplemented by what may be termed the elimination test. The results of blood-chemistry should be controlled by direct renal functional methods. The most popular of them, the dye elimination test, while universally employed, is not without errors. The phthalein concentration method is often disappointing, owing to the time element which is an essential factor in this test and to the variability of results, not always warranted by the state of the kidneys.

Of very great importance is the so-called concentration test, by which is measured the ability to concentrate solids. A normal kidney will change the concentration of urine according to the fluid intake. The greater the amount of fluids put into circulation, the more pronounced is the dilution of urine. In four hours, a normal kidney manages to rid the body of the water ballast, following which urine gradually regains its normal specific gravity. In prostaties with renal impairment, the kidneys are rigid and unadaptable. They have lost the power of dilution and concentration according to physiological requirements. The specific gravity of the urine remains within certain more or less narrow limits without regard to fluids or solids ingested. The method advised by Volhard, in the modification of Strauss, permits both tests to be done in one day without much discomfort to the patient. The patient receives in the morning 1000–1500 c.c. of fluids (warm tea) on an empty stomach, following which the urine is tested hourly. Four hours later, the patient receives his first meal and is put on a dry diet up to the next morning. The urine is again tested at frequent intervals. In the first few hours, there is water retention. The kidney is unable to dilute above a certain measure. The fluids are excreted hours later

and dilution comes at a period when a normal kidney would tend to concentrate. Hence, a more or less constant low specific gravity. Extrarenal factors which may obscure the results of the test can be eliminated by the use of pituitary injections.

Besides the actual renal function, the variable factor of the reserve power of the kidneys has to be reckoned with. The changes in the kidneys accompanying prostatic hypertrophy can be divided into separable functional disorders and into those of irreparable destruction. The former can be ameliorated by various means tending to eliminate temporarily the effects of back-pressure, retention, congestion, toxic absorption and gastro-intestinal stasis. After a period of preliminary treatment, one marvels to what extent the function of the kidneys can be improved. A retention catheter introduced into the bladder for gradual decompression, lasting for two or more weeks, will relieve congestion and restore the kidney function to a certain safety limit permitting further operation. In cases where the retention catheter fails to raise the threshold of kidney elimination above a certain level, a preliminary cystotomy may still have the desired effect. The preliminary operation seems to have a dynamic influence in restoring the kidney function. This may be due to released protein bodies which stimulate the kidneys into the supreme effort of self-repair. The failure to ascertain the reserve power of the kidneys with all possible accuracy is responsible for many cases of post-operative uræmia.

URÆMIA

The pathology of uræmia is still a disputed question. Many problems relating to uræmia await further study.

There are two forms of uræmic manifestations. The acute form, intervening within forty-eight hours or so post-operatively, does not bear the earmarks of true uræmia. It has much in common with eclamptic onsets and has been termed pseudo-uræmia. It is associated with cerebral and cord manifestations like amaurosis, hemianopsia, vomiting, exaggerated reflexes, Babinski, Kernig and convulsions. It follows post-operative traumatic shock, sudden lowering of blood-pressure and circulatory failure. The loss of blood and traumatic shock induces spasm of the renal vessels interfering with the normal blood-supply of the kidneys. Oliguria and anuria

are direct results of those extrarenal factors and may be relieved by paravertebral block of the roots of the twelfth dorsal and first lumbar segments or by autoblood injections. Both are reputed to inhibit the vasoconstrictors of the blood-vessels.

True uræmia, which manifests itself in hiccoughs, vomiting spells, headaches, pruritus, urinous fetor ex ore, and the like, is not an acute condition. The symptoms need time to develop and do not appear before the fifth or eighth day, post-operatively. It may take weeks before death supervenes. This form of uræmia is the direct consequence of renal failure. Anuria and oliguria, while often present, are not obligatory manifestations. There is retention of nitrogen bodies in the blood. However, as mentioned above, the quantity of nitrogen in the blood is not always indicative of immediate uræmic danger. Extrarenal factors may influence the degree of hemotoxæmia. Indicanæmia is an important pre-uræmic sign in cases where there is no marked gastro-intestinal fermentation. The rôle of the toxic aromatic products of intestinal putrefaction has been emphasized by Becher. In renal deficiency, nitrogen metabolic substances like urea, uric acid and creatinin, permeate into the spinal fluid without causing uræmic symptoms. It is with the absorption of the phenols and indols from the blood into the spinal fluid that uræmic coma starts to develop. According to his contention, the nitrogen retention prepares the ground for absorption into the spinal fluid of the above-mentioned substances, which call forth the final manifestations of uræmia.

THERAPEUTIC CONSIDERATIONS

Having diagnosed the ailment of prostatic hypertrophy, the question of radical *versus* conservative treatment comes up for discussion. The decision is not always simple for the following reasons:

(1) Prostatectomy, despite recent improvements, is still far from being a perfect procedure. The mortality is relatively high, amounting to 5-6 per cent., according to large statistics.

(2) Some of the milder stages of prostatic hypertrophy may persist for many years, the growth making little progress.

(3) The end-results of the operation in a certain percentage of cases are far from being satisfactory. Some of the symptoms may persist despite operation.

(4) Certain post-operative complications, like fistulæ, infection, loss of sexual power, *et cetera*, may occur despite the best technique employed

Against those negative factors, there are the following positive motives to be offered in evidence

(1) There is danger of having to perform the operation at a later period in a patient of lowered vitality

(2) The additional danger and inconvenience of catheter life is to be kept in mind

(3) There is a possibility of carcinomatous degeneration of the adenomatous growth. This occurs in 10 to 20 per cent of cases. The process starts insidiously and bone metastases are apt to appear later than in other cases of direct prostatic carcinoma

(4) Procrastination may cause irreparable damage to the kidney function

(5) Infection, stone formation, diverticulitis, pyelonephritis and cardiovascular disturbances are some of the other complications of delayed operation.

All those factors must be reckoned with before embarking on a course of treatment

Palliative treatment is indicated in uninfected cases with less than 200 c. c. of residual urine giving mild subjective symptoms. It consists in regulating the patient's mode of living and his dietary habits. A low-protein diet is advisable within certain limits, always remembering that too restricted a régime favors absorption of endogenous protein with the known results of protein starvation. A low-salt diet is essential in those cases. All kidney irritants should, of course, be omitted. The use of the catheter is the most important palliative in inoperable cases. However, catheterization in prostatics should not be considered a simple procedure. Cystitis, urethritis and epididymitis may follow catheterization. The passage of the first catheter may be a momentous step. A patient with a large residual who was able to control his bladder may lose the ability to do so after the first catheterization is attempted. The renal cardiovascular equilibrium may be disturbed beyond control. Hemorrhages and anuria may follow sudden evacuation of a distended bladder.

Among other palliative measures, the use of the X-rays deserves

mention X-ray irradiation may improve certain subjective symptoms, like frequency and dysuria. This is due to decongestion rather than to direct destruction of the adenomatous growth. As a substitute for operation, the X-rays are obsolete.

SURGICAL REMARKS

The danger of operation has been lessened considerably with the abandonment of general anaesthesia. The two methods which are being used with excellent results are spinal anaesthesia and so-called sacral block.

The intraspinal block commonly known as spinal anaesthesia, while offering perfect anaesthesia, is not without danger in cases of low blood-pressure. The sudden lowering of the blood-pressure and the post-anaesthetic shock may be responsible for some cases of post-operative anuria. The method in itself is simple and consists of the use of 0.1–0.12 cubic centimetre of novocain diluted in the spinal fluid and reinjected in the subarachnoidal space.

Sacral block has given most satisfactory results in the author's cases. There is no danger of complications following this form of anaesthesia. No post-anaesthetic care is necessary, except for proper protection of the temporarily devitalized tissues in the sacral region in order to avoid decubitus. The method is a combination of the transsacral and caudal block. Twenty cubic centimetres of a 1 per cent novocain solution are being injected into the sacral canal followed immediately by deposits of a few cubic centimetres of a similar solution into the sacral foramina according to the technic devised by Labat. Occasional failure to obtain satisfactory anaesthesia is the drawback of that otherwise excellent method.

As for the operation itself, the question of the suprapubic or perineal route of approach is for the surgeon to decide. It depends entirely on the skill and training of the operator. In both of them there may be complications which could or could not have been avoided. Lichtenstern demonstrated on post-operative specimens that the ejaculatory ducts are being damaged not only in perineal section, but also in some of the best performed suprapubic operations. However, at present, the suprapubic method seems to have the most adherents.

As to the question of the two-stage or one-stage operation, one has to rely on the condition of the patient. We favor the one-stage operation whenever possible, for psychological and technical reasons. To let the patient off the operating table with the consolation that he needs another operation has a depressing moral effect. Moreover, the second stage, made weeks or months later, is done under more difficult conditions. One has to manipulate through a contracted, sclerosed fistula on a prostate that has undergone secondary inflammation followed by fibrotic changes with adhesions to the capsule. Long hospitalization is another drawback. However, in neglected cases, the two-stage operation is often a life-saving procedure.

Mention should be made of more conservative attempts which came into vogue recently. The former Bottini cautery and Young's punch operation have paved the way to later modifications, of which the methods of Caulk, Collins and Stern are the most advanced in the field. Ingenious instruments have been devised for cutting slices of the prostatic bar with the cautery and the cutting current, respectively. This usefulness, however, is limited to small fibrotic prostates where an avenue is made for the escape of the urine. They cannot claim the benefit of prostatectomy in cases where the latter is indicated.

COMPLICATIONS AND POST-OPERATIVE CARE

The course of treatment of prostatic hypertrophy is not finished with the performance of the operation. The operation is not a final cure. Post-operative treatment is of the same vital importance as pre-operative preparation of the patient. There are many complications which may follow prostatectomy. We will try in the following to enumerate some of them with certain indications to meet them.

(1) Post-operative shock, while occurring less frequently than in the era when general anæsthesia was used exclusively, is still a force to be reckoned with. General supportive measures given before and during operation help to abate the gravity of symptoms.

(2) Post-operative hemorrhage, once the crux of prostatectomy, has been limited since an improved, more openly performed surgical technic has come into use permitting direct tying of some of the bleeders. Hot irrigations are an excellent hemostatic. Packing of

the prostatic loge, the use of the various bags designed by Hagner, Pilcher and Davis are of further assistance in the matter of hemostasis. It is a routine procedure with some surgeons to administer calcium, gelatin or thromboplastin before and after operation in order to increase the coagulability of the blood. A blood-platelet count should be taken in every patient before operation and the coagulation time should be tested. Elimination of prostatic congestion through proper pre-operative treatment is likewise of importance for the purpose of limiting post-operative hemorrhage.

(3) Hypostatic pneumonia, once so prevalent among this kind of patient, has been limited in its scope since the introduction of local anæsthesia. The proper posture of the patient after operation should not be neglected.

(4) Acidosis can be controlled by intravenous administration of glucose, hyperdermoclysis and ingestion of fruit juices and alkalis. Glucose neutralizes the toxic products and acts as a diuretic.

(5) Uncontrollable vomiting, while being a characteristic symptom of imminent uræmia, acidosis and the like, may be due to acute gastric dilatation caused by a too liberal water intake on an empty stomach.

(6) Embolism is more likely to occur in cardiovascular failure or in a restless patient.

(7) Pyelonephritis with sudden rise of temperature and chilliness has usually a limited course of from four to seven days. Urotropin given intravenously is of great help. In fatal cases, one finds multiple small abscesses scattered throughout the kidney substance.

(8) Seminal vesiculitis may give rise to intermittent attacks of fever.

(9) Infection of the prevesical space, gangrene, sloughing of the wound and peritonitis can be avoided with the proper technic and with more regards for asepsis during and after operation.

(10) Oliguria and anuria, due to sudden evacuation of the bladder and following kidney shock, can be avoided if one decreases the bladder pressure gradually. The apparatus described by Zwalenberg for gradual drainage is a simple and effective device for this purpose.

(11) Toxic psychoneurotic disturbances are not a rare compli-

cation of prostatectomy and may lead to exhaustion if not properly controlled by sedatives and by change of environment.

Later complications are as follows.

(1) Stricture at the vesico-urethral junction or in the prostatic urethra may be due to left-over tissue flaps and consecutive fibrosis. They can be avoided by careful trimming down of all redundant tissue and by the proper dilatation after operation. Every patient should have a sound passed time and again weeks and months after operation, in order to avoid possible stricture formation.

(2) Permanent fistula is due to an overlooked obstruction like strictures, fibrosclerosis, diverticulum or a neuropathic bladder. An incision in the bladder placed too low down near the sphincter tends to persist longer than a properly placed bladder section.

(3) Impotentia occurs in a certain percentage of cases, irrespective of the route of approach selected.

(4) Incontinence due to injury of the external sphincter is more prevalent in perineal prostatectomies or in cases of unrecognized tabes.

(5) Epididymo-orchitis occurs in 20 per cent of the cases and can be avoided by prophylactic vasoligature.

(6) Cystitis, favored by stasis of urine in a diverticulum-like pouch formed in the prostatic bed and through injury to the internal sphincter, requires frequent bladder irrigations and internal antiseptics for some time after operation.

(7) Curious incidents of periostitis and osteitis pubis have been described by Aschner as a result of post-operative infection.

CONCLUSIONS

Prostatic hypertrophy is a disorder causing far-reaching complications and indirectly affecting organs of vital importance. Nearly half of the patients exhibited some sort of cardiovascular derangements. A large number of cases have arteriosclerotic and nephritic changes of the kidneys. "Back-pressure" has a destructive influence upon the kidney substance and interferes with renal function. Advanced age lowers the vitality of the patients. The management of prostatic hypertrophy is therefore an art more exacting than in other fields of operative surgery. The technic of prostatectomy has

reached a certain limit of relative perfection and, except for details, one cannot expect radical changes in the near future. The only hope of lowering the mortality rate, which is still high, lies in a better appreciation of the principles underlying the pre- and post-operative care of the patient. The patient should be considered in the light of being a medical as well as a surgical risk. Proper cooperation of the medical man with the urologist is essential. The old slogan to treat the patient rather than the disease has its full significance in prostatic hypertrophy.

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